Province of British Columbia
Ministry of Environment and Parks
Annual Report, 1987/88

Honourable Bruce Strachan
Minister of Environment

Richard L. Dalon
Associate Deputy Minister

British Columbia Cataloguing in Publication Data

British Columbia. Ministry of Environment and Parks. Annual report. — 1986/87–

Continues: British Columbia. Ministry of Environment. Annual report. ISSN 0227-7506
Continues in part: British Columbia. Ministry of Lands, Parks and Housing. Annual report. ISSN 0838-1976
Report year ends Mar. 31.
ISSN 0838-1933 = Annual report — Ministry of Environment and Parks (Victoria)

1. British Columbia. Ministry of Environment and Parks — Periodicals. 2. Environmental policy — British Columbia — Periodicals. 3. Parks — Government policy — British Columbia — Periodicals.

HC117.B7B757 354.7110682'32

To His Honour
The Lieutenant Governor of the
Province of British Columbia

May It Please Your Honour:

Herewith I beg respectfully to submit the annual report of the British Columbia Ministry of Environment and Parks for the period April 1, 1987 to March 31, 1988.

Bruce Strachan
Minister of State for Cariboo,
Responsible for Environment

The Honourable Bruce Strachan
Minister of Environment and Parks

Sir:

I have the honour to submit the annual report of the British Columbia Ministry of Environment and Parks for the period ended March 31, 1988.

Richard L. Dalon
Associate Deputy Minister of State
for Cariboo, Responsible for
Environment

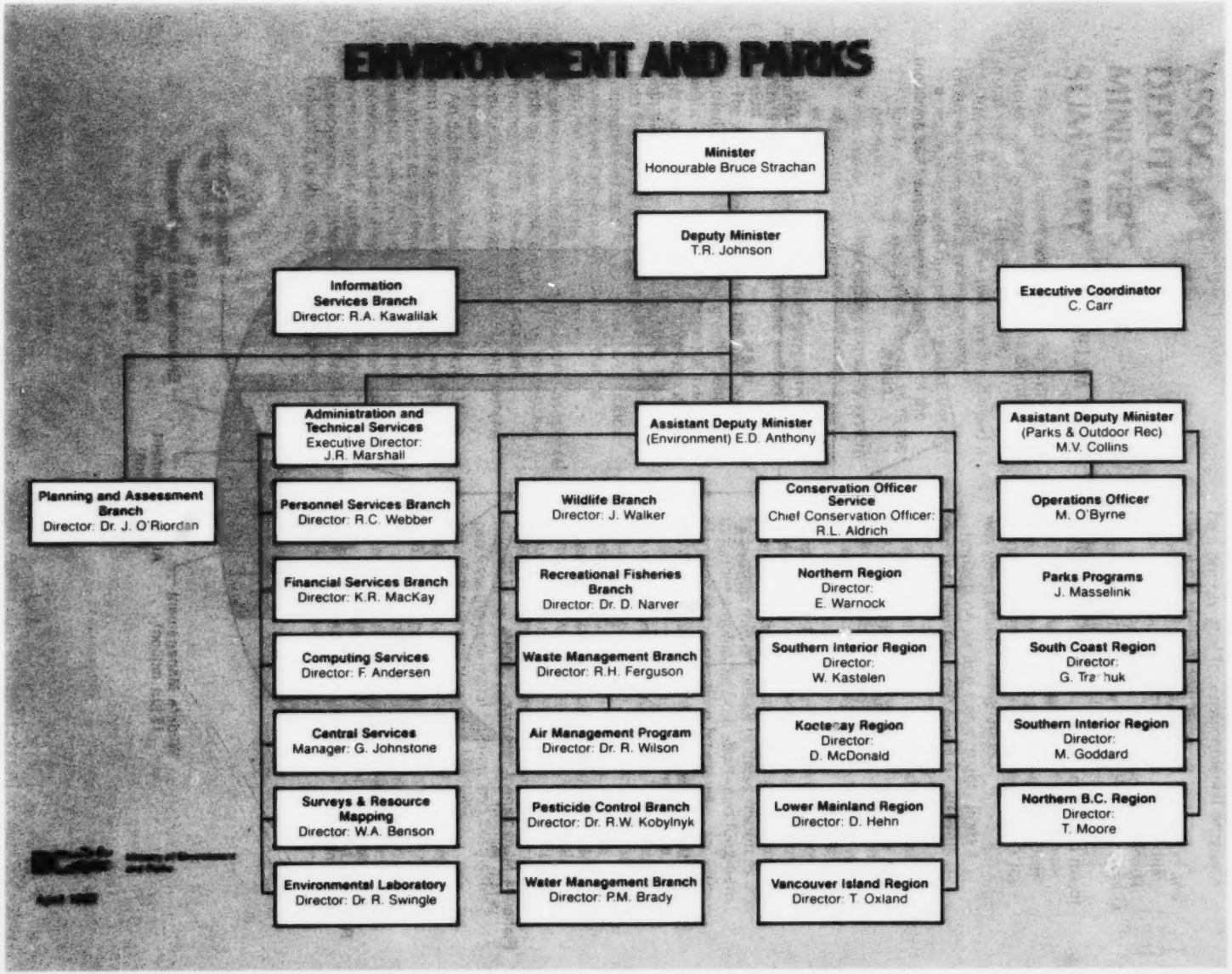
Contents

Associate Deputy Minister's Summary 9

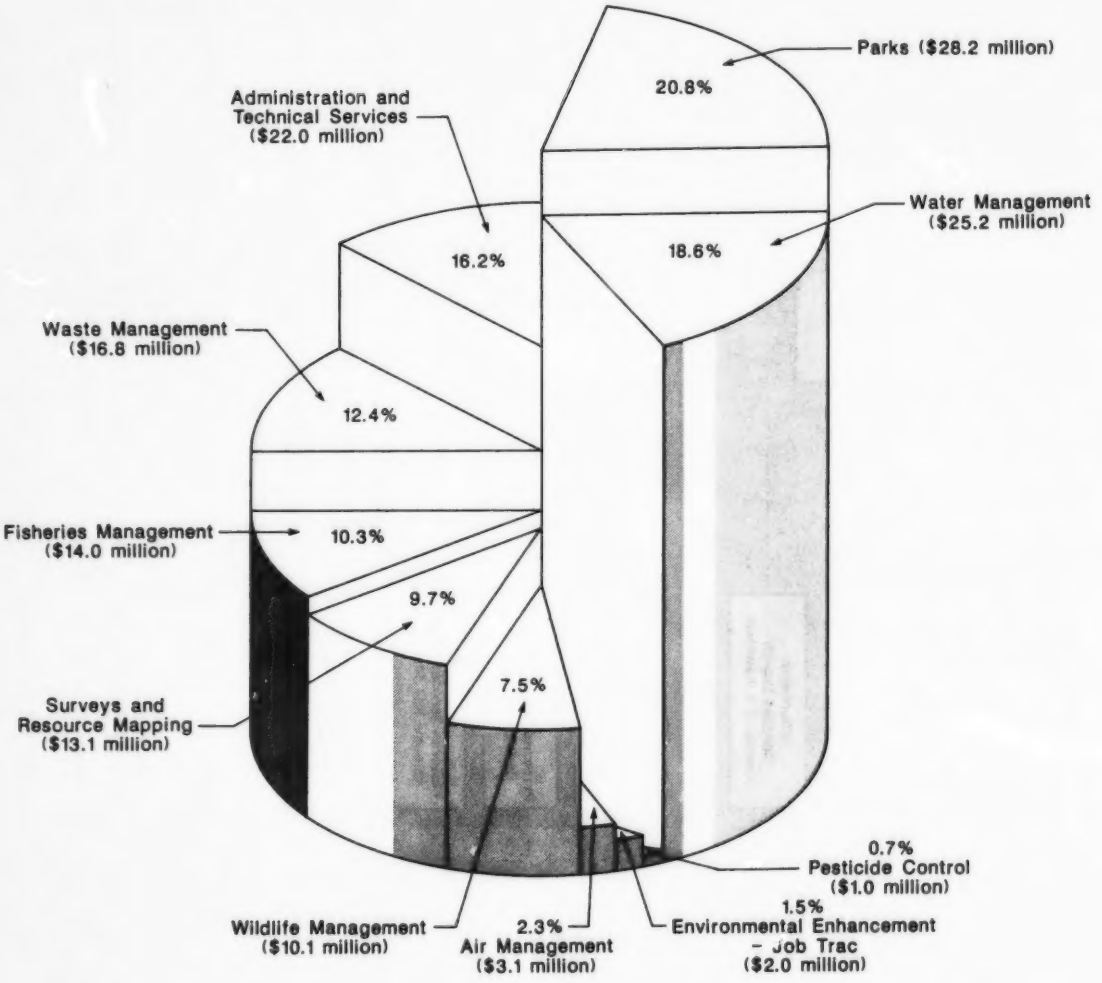
Programs

Parks and Outdoor Recreation 11
Recreational Fisheries Management 19
Wildlife Management 25
Water Management 37
Air Management 43
Waste Management 47
Pesticide Control 51
Surveys and Resource Mapping 55
Administration and Technical Services 59
- Financial Services 59
- Personnel Services 62
- Central Services 63
- Planning and Assessment 64
- Environmental Laboratory 67
- Computing Services 68
- Conservation Officer Service 69
- Information Services 72

Environmental Appeal Board 75


ENVIRONMENT AND PARKS
Minister
Honourable Bruce Strachan
Deputy Minister
T.R. Johnson
Information Services Branch
Director: R.A. Kawalilak
Executive Coordinator
C. Carr
Planning and Assessment Branch
Director: Dr. J. O'Riordan
Administration and Technical Services
Executive Director: J.R. Marshall
Personnel Services Branch
Director: R.C. Webber
Financial Services Branch
Director: K.R. MacKay
Computing Services
Director: F. Andersen
Central Services
Manager: G. Johnstone
Surveys & Resource Mapping
Director: W.A. Benson
Environmental Laboratory
Director: Dr. R. Swingle
Assistant Deputy Minister
(Environment) E.D. Anthony
Wildlife Branch
Director: J. Walker
Recreational Fisheries Branch
Director: Dr. D. Narver
Waste Management Branch
Director: R.H. Ferguson
Air Management Program
Director: Dr. R. Wilson
Pesticide Control Branch
Director: Dr. R.W. Kobylnyk
Water Management Branch
Director: P.M. Brady
Conservation Officer Service
Chief Conservation Officer: R.L. Aldrich
Northern Region
Director: E. Warnock
Southern Interior Region
Director: W. Kastelen
Kootenay Region
Director: D. McDonald
Lower Mainland Region
Director: D. Hehn
Vancouver Island Region
Director: T. Oxland
Assistant Deputy Minister
(Parks & Outdoor Rec)
M.V. Collins
Operations Officer
M. O'Byrne
Parks Programs
J. Masselink
South Coast Region
Director: G. Trachuk
Southern Interior Region
Director: M. Goddard
Northern B.C. Region
Director: T. Moore

MINISTRY BUDGET $135.5 MILLION



ASSOCIATE DEPUTY MINISTER'S SUMMARY

This annual report documents the work of the Ministry of Environment and Parks during the fiscal year ending March 31, 1988.

During this period, the ministry discharged a broad mandate which encompassed:

- maintaining environmental quality through the management and protection of the land, water, air and living resources of the province, and
- managing and developing a quality system of provincial parks, recreation areas and ecological reserves.

The objectives of individual programs are described under the appropriate sections of the report.

The ministry's work during the year was carried out in the context of greatly heightened public concern about environmental issues, and many activities commanded a correspondingly high degree of public involvement. No fewer than five specially appointed advisory committees or task forces undertook public reviews on behalf of the ministry during 1987/88, examining and making recommendations on issues as diverse as special waste management, the future of Strathcona Provincial Park, the health of falcon populations, game farming, and commercial river rafting.

An additional focus, with significant long term implications for the ministry, was provided by cabinet endorsement of the report of the National Task Force on Environment and Economy, which emphasized sustainability of environmental resources and economic development. Implementation in British Columbia of the report's recommendations will be a priority goal for environmental programs during the years to come.

Another event with a national dimension and widespread public participation was Wildlife '87, the centennial of conservation in Canada. Highlights of the celebration in British Columbia were the designation of six Wildlife Management Areas, the introduction of a major wildlife education program, and a province-wide vote to select the provincial bird. Over 80,000 ballots were cast, and the Steller's Jay was given official designation.

Impacts on air and water quality from a variety of sources were cause for growing concern throughout the province, and placed increasing demands on both regional and headquarter staff who work with industry and other governments to develop and implement suitable strategies for dealing with these issues. Similar concern for wildlife and freshwater fish habitats, and for the future growth and sound management of the park system, called on the ministry to take an increasingly prominent leadership role on behalf of these resources and to further emphasize both short- and long-term planning in conservation programs.

Where greater efficiency could be achieved in the delivery of services, the ministry continued to pursue joint venture or contractual arrangements with the private sector. Prominent among the successful examples were the ongoing digital mapping program undertaken in partnership with the private sector mapping industry, contracting of some provincial park campground operations and maintenance, and negotiations with a commercial publisher to co-produce the provincial hunting and freshwater sportfishing regulations for 1988/89.

The Minister's Environmental Awards for 1987, recognizing significant contributions to the environmental well-being of the province, were given in an expanded range of categories. The recipients included a major food chain, a school district, an Indian band, and several conservation groups.

Parks and Outdoor Recreation

Parks and Outdoor Recreation (B.C. Parks) is responsible for the designation, management and conservation of a land and water based system of parks, recreation areas and ecological reserves containing the best representative elements of British Columbia's natural and cultural heritage for the enjoyment, inspiration and recreational use of British Columbians and their visitors.

Legislation Administered

Park Act
Ecological Reserves Act
Park (Regional) Act

Planning and Land Acquisition

For the first time, a formal B.C. Parks policy statement was released to the public for review and comment. Entitled "Striking the Balance," this document will be the basis for discussions concerning policy, management principles and future direction for B.C. Parks.

Implementation of the 1986 Wilderness Advisory Committee recommendations continued to to be the priority for much of the planning and acquisition work this year. The outstanding items that were addressed included continuation of the studies for the Tatshenshini and Redfern areas; expansion of the Robson Bight Ecological Reserve; final clearance for establishing the Tahsish River Ecological Reserve; announcement of a grizzly bear study for the Khutzeymateen; continuing negotiations on the South Moresby proposal and acquisition of additional Pacific Rim National Park inholdings.

In terms of land acquisition for the provincial park system, four new "pocket wilderness" areas were established: Eskers Park and Coquihalla Summit, Lake Lovely Water and Mt. Joffre Recreation Areas. Nine small lakefront parks and recreation areas were established and Meziadin and Kinaskan Parks were officially designated. There were also additions to three established parks. Ninety-nine year leases were created with the Nature Trust for land at the Recreation Area Roderick Haig-Brown and Botanical Beach.

As part of the program to place local park administration in the hands of local governments, three Class C parks were transferred. In addition, $4,100 (50 per cent of development costs) in grants were given to five Class C Park Boards for assistance in the provision of recreational facilities.

Master plans, prepared to provide the long term guidelines for both park development and management, were approved by the Assistant Deputy Minister for Hamber, Kinaskan Lake, Ruckle and Tweedsmuir Provincial Parks.

Resource Management and Facility Maintenance

Resource management activities included the completion of three management plans to reduce potential conflicts between grizzly bears and park visitors in Valhalla, Elk Lakes and Mount Assiniboine Parks.

Two habitat improvement projects, centring on elk in Strathcona Park and moose in Wells Gray Park, were also completed, as was a study of the deer population on Sidney Island.

A study of freshwater recreational fisheries within Parks was undertaken as a preliminary step in developing more efficient planning and management strategies for this popular park activity.

Work continued with wildlife population counts, hunter reports, biophysical studies and creel surveys in order to monitor the health and numbers of fish and wildlife within parks.

Just over two million dollars was expended on the repair and replacement of the developed facilities within the park system, with projects ranging from campground reconstruction to beach sanding. A major study of all water pumps within the system was undertaken to locate and replace any with possible PCB contamination.

Twenty-two projects with a total value of $1.75 million were completed through the cooperative Youth Employment Program (Job-Trac and Career-Trac) and a contract with the Outdoor Recreation Foundation of B.C. Extensive trail reconstruction was carried out in numerous parks. Picnic shelters, fencing, adventure playgrounds and various campsite and day use improvement projects to provide improved recreational opportunities were also completed throughout the province.

In addition, projects totalling $200,000 were funded through two recoverable programs. In

Strathcona Park, trail development was undertaken at Forbidden Plateau and a beach sanding project was completed at Buttle Lake. In the Skagit Valley Recreation Area, a visitor use survey was conducted and a foot bridge was constructed at Sumallo Grove.

Visitor Services

In 1987, B.C. Park visitation increased to the highest level ever, just over 19 million visits, with a 9 per cent increase in day use and 10 per cent increases in both the camping and boating visitation. Camping revenues increased from $3.5 to $4.1 million, reflecting both increased use and an increased fee schedule introduced late in the season.

Customer satisfaction was again monitored in 1987. Surveys were conducted in 40 campgrounds, 30 beach-picnic areas, eight backcountry areas and four marine parks. Over 9,000 park visitors gave their opinions of provincial parks and their services.

Eighty-three per cent of interviewed campers gave the park they were camping in an overall rating of excellent to above average. In the selected beach-picnic areas, backcountry parks and marine parks surveyed, the overall rating was 84 per cent, 95 per cent and 96 per cent respectively.

Interpretive programs were available in 47 parks (41 in 1986) and were enjoyed by some 430,000 visitors. Private contractors now provide these programs in 23 parks (19 in 1986). Several new interpretive and informational signs were installed to provide enhanced educational and orientation messages about parks and their special resources. Twelve hundred new signs, using a more colourful identification format, were situated on major and secondary roads to indicate park locations. Two new titles were added to the more than 60 publications produced and distributed by Parks.

The many volunteers in parks continue to benefit both the park visitor and park staff. In 1987, 1,271 volunteers contributed 28,282 hours to parks. The cost of the program was $64,201.

Seven new visitor concession permits were issued, increasing the number to 36. B.C. Parks Concessions generated a gross revenue of over $2.2 million with a return to the province of $87,000.

Public safety and security of park visitors (and staff) continues as a priority for the agency. 72,919 hours were recorded by Park Rangers responding to 22,919 incidents in Provincial Parks. The outdoor experience of park visitors should be enhanced by the conferring of "enforcement officer" authority on Park Rangers.

There were successful reductions in injuries and losses to visitors, and thefts from visitors were reduced by 21 per cent. Theft of park property was reduced by 8 per cent with a decrease in dollar loss of 55 per cent. Much of this success is due to the installation of alarm systems for equipment compounds. Success is also attributed to accurate reporting, evaluation of incidents and the corrective action taken by field staff.

Employee accident prevention was the year's highlight. Although the record has been improving steadily since 1980, 1987 produced 30 per cent fewer accidents, 48 per cent fewer time loss accidents and 75 per cent fewer days lost. Much credit goes to the Industrial Health and Safety committees for a job well done.

Ecological Reserves

Ecological reserves are set aside to preserve samples of representative, rare or endangered ecosystems of British Columbia. They offer long-term research and educational opportunities, as well as non-consumptive public uses, such as nature photography and bird watching.

During 1987/88, a 412-hectare upland area was added to the marine Robson Bight Ecological Reserve. The Douglas fir forest of Nimpkish Island (18 ha) was purchased to create a new reserve, and hydrological work was completed to stabilize the island. The ecological reserve system, at the end of March 1988, included 117 reserves covering 155,000 ha of which roughly one-third consist of marine waters.

Forty research projects were conducted in ecological reserves, with 19 of these involving long-term studies of vegetation and/or wildlife. Research was sponsored for studies of the Vancouver Island marmot in the Haley Lake reserve, and of killer whale behaviour at the rubbing beaches in the Robson Bight reserve. Seven master's thesis (of which two were completed) and three Ph.D. thesis projects were conducted in or about ecological reserves.

Management issues were dealt with in 22 reserves, and a format and guidelines were developed for an ecological reserve management plan.

The "Guide to Ecological Reserves in British Columbia" was completed and distributed to land managers in government agencies, conservation agencies, universities, colleges and public libraries. An update to the "List of Reports and Publications for B.C. Ecological Reserves" was also distributed to more than 260 researchers.

RESOURCE/PARK USE PERMIT TABLE

Type	83/84	84/85	85/86	86/87	87/88
Private Purposes (cabins, access roads, etc.).....	124	117	195	203	197
Public Service (guiding, resorts, etc.).....	136	151	178	159	196
Industrial/Commercial Use (pipelines, transmission lines, etc.).....	303	334	362	338	355
Provincial or National Public Benefit (scientific reserach, movies, etc.).....	76	47	15	45	45
TOTALS.....	639	649	750	745	793

CONTRACT SUMMARY TABLE - 1987/88

Program	No. of Contracts	Value of Contracts
Visitor Services		
Park Maintenance	149	1,884,836
Others (Firewood, Interpretation, etc.)	859	1,643,631
Resource Services	481	1,892,758
Planning & Ecological Reserves	42	122,824
Finance & Administration	93	132,582
Park Management Services	8	51,178
TOTAL:	1632	5,727,809

PARK MANAGEMENT - YEARLY COMPARISON

	1983/84	1984/85	1985/86	1986/87	1987/88
Visitation:					
Campground Use	2,145,111	1,989,475	1,963,830	2,028,637	2,226,992
Day Use	12,841,189	12,488,974	13,556,225	15,126,906	16,473,431
Boating Use	257,773	268,656	301,103	302,438	333,827
TOTAL VISITATION[1]	15,244,073	14,747,105	15,821,158	17,457,981	19,034,250
Revenue (000$):					
Campground	2,821	3,491	3,409	3,552	4,108
Park Use Permits and Concessions	185	133	170	214	239
TOTAL	3,006	3,624	3,579	3,766	4,347
Expenditures (000$):					
Capital	3,493	4,143	9,898	2,575	2,415
Land Acquisition	128	110	169	92	2,732
Operations	22,179	23,386	25,312	25,858	25,829
TOTAL	25,800	27,639	35,379	28,525	30,976
Adjusted Operation[2]	25,302	25,720	26,978	26,691	25,829
Adusted Total[2]	29,433	30,379	37,707	29,444	30,976
Staffing (Man Years):					
Yearly	353	288	295	301	268
Seasonal	269	269	253	244	218
TOTAL	622	557	548	545	486
Resource Management Indicators					
Park Hectares (thousand)[3]	4,612.5	4,644.8	4,644.6	4.792.6	5,361.6
BC Population (thousand)[4]	2,820.5	2,857.7	2,883.5	2,906.0	2,941.8
Park area per resident	1.64	1.63	1.61	1.65	1.82
Park investment/resident (adjusted)	10.11	10.30	12.66	9.81	10.53
Imp. landscapes represented	31/52	31/52	31/52	35/52	36/52
Important Management plans completed	22/70	24/70	33/70	36/70	40/70
Visitor Services Indicators					
Visitors per staff man year	22,093	26,478	28,871	32,033	39,165
Operation cost/visitor (adjusted)	1.66	1.74	1.71	1.53	1.36
Campsite occupancy[5]	63	56	54	56	61
Campground revenue per campsite ($)	265	312	301	314	360

1 Visitation is for calendar year ending in fiscal year.
2 Expenditures adjusted for inflation to 87/88 fiscal Vancouver C.P.I.
3 Hectares for calendar year ending in fiscal year.
4 Statistics Canada based on '81 census.
5 Camper party nights divided by campsites.

ADDITIONS TO THE PROVINCIAL PARKS SYSTEM 1987/88 FISCAL YEAR

	Area (Hectares)
New Parks/Recreation Areas	
Walloper Lake Park	55
Coquihalla Summit RA	5,750
Stake-McConnell RA	189
Arrow Lake (Shelter Bay) Park	21
Meziadin Lake Park	335
Trout Lake Park	316
Kootenay Lake Park	302
Kootenay Lake RA	43
Kinaskan Lake Park	1,800
Eskers Park	1,603
Texas Creek Park	112
Columbia Lake Park	260
Adams Lake Park	56
Joffre Lakes RA	1,460
Lake Lovely Water RA	1,300
TOTAL	13,602
Additions to Existing Areas	
Okanagan Lake Park	1
Skookumchuck Narrows Park	88
Athalmer Beach Park	1
TOTAL	90

PARK SYSTEM AS OF MARCH 31, 1988

Type	Number	Area (Hectares)
Class "A"	299	4,040,220
Class "B"	2	25,212
Class "C"	32	1,104
Recreation Area	54	1,166,573
Wilderness Conservancy	1	131,523
TOTAL	388	5,364,632

RESOURCES USED - YEARLY COMPARISON
(FTE and Operational Expenditures - Office Breakdown)

Office	1985/86 FTEs Person Years	1985/86 Operational Expenditures ($000)	1986/87 FTEs Person Years	1986/87 Operational Expenditures ($000)	1987/88 FTEs Person Years	1987/88 Operational Expenditures ($000)
Headquarters Victoria	64	3,430	59	3,879	57	3,638
South Coast Regional Office	16	1,035	18	1,133	19	1,227
Strathcona District	50	1,945	49	2,066	49	2,144
Malahat District	35	1,416	34	1,427	32	1,439
Fraser Valley District	88	3,527	90	3,796	88	3,921
Garibaldi/Sunshine Coast District	34	1,375	33	1,490	31	1,478
Southern Interior Regional Office	17	772	19	1,055	19	1,003
Thompson River District	37	1,912	38	2,349	36	2,150
Okanagan District	24	1,154	26	1,349	24	1,299
West Kootenay District	25	1,094	27	1,156	26	1,192
East Kootenay District	23	1,058	26	1,209	26	1,230
*Fort Steele Historic Park	21	1,033	18	*	*	*
Northern Regional Office	14	889	14	1,011	13	1,017
Skeena District	19	993	19	1,132	18	1,154
Cariboo District	20	920	18	911	16	980
Prince George District	21	992	20	1,021	18	1,071
Peace-Liard District	17	803	16	875	14	886
*Barkerville Historic Park	23	964	21	*	*	*
	548	25,312	545	25,859	486	25,829

*Transferred part way through 1986/87 to Ministry of Tourism, Recreation and Culture.

PARK MANAGEMENT - YEARLY COMPARISON

	1983/84	1984/85	1985/86	1986/87	1987/88
Visitation:					
Campground Use	2,145,111	1,989,475	1,963,830	2,028,637	2,226,992
Day Use	12,841,189	12,488,974	13,556,225	15,126,906	16,473,431
Boating Use	257,773	268,656	301,103	302,438	333,827
TOTAL VISITATION[1]	15,244,073	14,747,105	15,821,158	17,457,981	19,034,250
Revenue (000$):					
Campground	2,821	3,491	3,409	3,552	4,108
Park Use Permits and Concessions	185	133	170	214	239
TOTAL	3,006	3,624	3,579	3,766	4,347
Expenditures (000$):					
Capital	3,493	4,143	9,898	2,575	2,415
Land Acquisition	128	110	169	92	2,732
Operations	22,179	23,386	25,312	25,858	25,829
TOTAL	25,800	27,639	35,379	28,525	30,976
Adjusted Operation[2]	25,302	25,720	26,978	26,691	25,829
Adusted Total[2]	29,433	30,379	37,707	29,444	30,976
Staffing (Man Years):					
Yearly	353	288	295	301	268
Seasonal	269	269	253	244	218
TOTAL	622	557	548	545	486
Resource Management Indicators					
Park Hectares (thousand)[3]	4,612.5	4,644.8	4,644.6	4.792.6	5,361.6
BC Population (thousand)[4]	2,820.5	2,857.7	2,883.5	2,906.0	2,941.8
Park area per resident	1.64	1.63	1.61	1.65	1.82
Park investment/resident (adjusted)	10.11	10.30	12.66	9.81	10.53
Imp. landscapes represented	31/52	31/52	31/52	35/52	36/52
Important Management plans completed	22/70	24/70	33/70	36/70	40/70
Visitor Services Indicators					
Visitors per staff man year	22,093	26,478	28,871	32,033	39,165
Operation cost/visitor (adjusted)	1.66	1.74	1.71	1.53	1.36
Campsite occupancy[5]	63	56	54	56	61
Campground revenue per campsite ($)	265	312	301	314	360

1 Visitation is for calendar year ending in fiscal year.
2 Expenditures adjusted for inflation to 87/88 fiscal Vancouver C.P.I.
3 Hectares for calendar year ending in fiscal year.
4 Statistics Canada based on '81 census.
5 Camper party nights divided by campsites.

Recreational Fisheries Program

The goal of the Recreational Fisheries Program is to bring social, economic and recreational benefits to British Columbians through conservation, management and use of freshwater fish, fisheries and habitats. Consistent with this goal, the program's objectives are:

1. To maintain and enhance habitat which will support natural and cultured populations of fish.
2. To provide abundant and diversified recreation opportunities while protecting desirable populations of fish.
3. To support and regulate uses of fish for social and economic benefits.

Legislation Administered

Fisheries Act (Canada) and Regulations
Wildlife Act and Regulations

Habitat Management

Fisheries habitat management comprises three major activities: protection, assessment, and improvement.

Protection

An unprecedented 20,000 habitat referrals, mostly forestry-related, were processed by regional habitat protection staff this year. Pesticide referrals continued to increase, numbering 755 in 1987, some 188 more than in 1986.

The size of pesticide application areas has been increasing dramatically, and this trend is expected to continue with proposed changes to pesticide control regulations. A computerized referral system, which will give staff more time to monitor compliance and the effectiveness of ministry recommendations, is expected to be operational in 1988.

The Coastal Fisheries/Forestry Guidelines were implemented during the year. This program will guide logging activities on the coast while protecting fish habitat.

Under the Forest Resource Development Agreement (FRDA), $600,000 was provided for the investigation, mitigation, and monitoring of FRDA initiatives on fish and wildlife habitat. Two fisheries research projects dealing with bioassay protocol development and chronic toxicity testing were also funded under FRDA.

A particularly dry year in the southern interior accentuated the need for more effort in securing adequate flows for fish. A federal/provincial committee was established to select the appropriate methodologies and propose policy changes.

A planning approach based on a land systems methodology has been introduced. It seeks to identify those land types which are more susceptible to disturbance and by combining this information with fishery values, set logical priorities for habitat protection.

Several mines with possible major habitat impact were reviewed, including Cinola (in the Queen Charlotte Islands), Golden Bear and Johnny Mountain (both in the northern Skeena region).

Mitigation agreement has been achieved for Alcan's Kemano Completion, under which the company will divert flows from the Nechako River through Kenny Dam to increase hydro-electric power for its aluminum smelter in Kitimat. Under the agreement, fisheries losses will be mitigated by developing river and lake fisheries on tributaries and elsewhere in the Nechako basin.

A three-year agreement with B.C. Hydro is due to commence in 1988 to conduct a fish stock assessment of Williston Reservoir and identify enhancement opportunities.

Negotiations were also successfully completed with the Forest Service to find alternative access routes to timber in order to protect the Babine steelhead fishery. Proposed logging road access to select areas of the Babine River would have had a negative impact on this isolated, high quality steelhead sport fishery. Similar issues are developing on the Sustut River. Resource use planning projects are being developed on both the Dean and Babine rivers.

Assessment

In 1987-88, 52 lakes and four stream systems were surveyed and assessed for fisheries and habitat management purposes. Several other lakes were mapped using regional data on the computer-assisted bathymetric mapping program.

Field testing and regional training in the use of the federal/provincial stream survey card and the Stream Information Summary System began in 1987-88. Planning and mapping workshops have been held with the Department of Fisheries

and Oceans on survey procedures, computer mapping requirements, and management applications.

Computer assisted mapping software development continued. Digitizing of streams for about 50 per cent of the province has been completed at the "major stream" level in cooperation with the Water Management Branch, and will be used in the Geographic Information Systems Development being spearheaded by the Surveys and Resource Mapping Branch.

Extensive involvement in the Fish/Forestry Interaction Program on the Queen Charlotte Islands continued throughout the year. The Physical Processes Unit coordinated the development of the 5-year Phase II geomorphology research program and provided major input to a Coastal Terrain Stability Handbook.

Applied research focused on terrain stability studies in the Lower Mainland and on a literature review of factors such as large organic debris that affect the stability of large river channels. Methodology development included joint authorship of the Terrain Classification Manual for B.C.; analysis of the use of computer-processed photogrammetric data to look at changes in streams over time; and examination of the use of balloon photography to map the planimetric features of stream reaches.

Improvement

Fish habitat improvement included 30 projects conducted under the Habitat Conservation Fund (HCF) which is generated from a surcharge on angling licences. Total HCF expenditures on fisheries projects in 1987/88 was $600,000. Projects included:

1. Stream enhancement (spawning habitat created or restored) = 11 projects
2. Lake enhancement (introduce sport fish, water storage, fertilization, bass habitat, aeration, chemical rehabilitation) = 9 projects
3. Stream protection (streambank fencing) = 1 project
4. Feasibility and habitat capability studies (lake rehabilitation potential, lake aeration, stream habitat improvement) = 5 projects
5. Education (films, video, media) = 3 projects
6. Land acquisition (angler access) = 1 project

Recreational Fisheries

The 1985 survey of freshwater angling in British Columbia indicated that the number of days spent fishing has been increasing annually, while the catch has not increased at the same rate. There is little doubt that the demand for recreational fishing exceeds the productive capacity of our waters in several areas of the province.

In 1987-88, 389,448 freshwater angling licences were sold. Just over 20 per cent of these licences were purchased by anglers visiting from outside the province. There were 242 angling guides and 136 assistant angling guides licenced in 1987-88.

On August 1, 1987, angling licence fees were increased by one dollar while licences costing $10 or more were increased by $2. Total revenue from the sales of all freshwater angling licences, in 1987-88, was $3.9 million.

New licences were introduced on April 1, 1987 to better manage two world renowned sport fisheries: Kootenay Lake, where anglers now require a Kootenay Lake Rainbow Trout Licence to keep rainbow trout over 50 cm in length from the main body of the lake; and the Dean River, where anglers wishing to fish the high-use section of the river must obtain a Special Fisheries Permit.

Fish Culture

Five provincial hatcheries and several contract facilities rear freshwater sport fish for stocking as fry, fingerlings and catchable-size fish. In 1987, 996 lakes and 93 streams were planted with over 13 million rainbow, cutthroat, steelhead, brook and brown trout and kokanee. About 1.8 million of these were steelhead and searun cutthroat reared at federal and public involvement fish culture facilities. The total weight of fish released was 114 000 kilograms.

In 1987, over 16 million eggs were collected, primarily from wild rainbow trout trapped at egg-stations on major brood stock lakes. The total number of eggs collected, in 1987, was less than the previous year due to reduced availability of kokanee eggs.

Testing of broadstock continued on a regular basis, to prevent fish diseases in hatcheries. New water wells were drilled and outdoor rearing ponds covered at Kootenay Trout Hatchery to reduce the risk of infection.

A staging facility in Prince George was developed in 1987 at the Pacific Western Brewing site. This facility will serve as a holding site for fish plantings in northern waters.

Fish culture research included improvement of water oxygenation, brood fish diet experiments, and exploration of egg collection opportunities at Cunningham Lake (near Vanderhoof) for lake char and kokanee.

Research

An evaluation of the Okanagan Skaha Hatchery kokanee releases was undertaken to determine the best size and time for release of these fish. The survival of these fry to catchable size and their availability to anglers was also determined.

A method of collecting angling information on small trout lakes was developed as a guide to determine stocking ratess and for setting appropriate angling regulations. A data system is also being developed for kokanee in large lakes to aid in their management.

Numerous lake aeration projects across the province are being evaluated. The possibility of using solar-powered systems for aerating winterkill lakes is also being examined.

Efforts are also being made to locate wild rainbow trout stocks for the hatchery program that are suited for stocking into lakes containing coarse fish.

Introducing sterilized coho salmon in landlocked lakes is a potential method for coarse fish control if coho feed heavily on young coarse fish. Research on this concept is underway on Till Lake in the Cariboo.

Selected late-maturing stocks of rainbow trout are being examined for possible use for future hatchery egg supplies, since early maturing trout do not survive as well nor grow as large as late maturing fish. The creation of brood adults that only produce female offspring is also under investigation.

Ocean survival of steelhead returning to the Keogh River, on northern Vancouver Island, is being determined. This information will facilitate forecasting of adult run sizes and setting of angling regulations. Other Keogh River studies include freshwater survival of steelhead from egg to smolt size, stream enrichment, and netpen culture of steelhead smolts to determine the effect of feeding, smolt quality, and stocking location on hatchery adult returns.

Rainbow trout broodstock development from resident stream stock will be valuable to the hatchery program for establishing or augmenting depressed stream fisheries. Blackwater and Dean river rainbow are currently being reared for brood fish.

Large Lakes and Reservoirs

Annual assessments of trout populations in large lakes on Vancouver Island are made by snorkel survey counts of spawning trout in streams.

A major five-year study of rainbow trout, lake trout and kokanee was initiated on Shuswap Lake with future enhancement the primary objective.

Major expansion of Hill Creek Hatchery, in the West Kootenays, was initiated by private sector contract early in 1988 with completion expected by July 1988. A record 13,000 kokanee returned to Hill Creek spawning channel in 1987. These fish are the initial results of enhanced production for Arrow Lake.

A survey of Kootenay Lake anglers showed nearly 40,000 angler days and 16,000 trout caught in the main body of Kootenay Lake.

The second year of experimental lake fertilization was completed at Balfour to enhance West Arm Kootenay Lake fish stocks. Six netpens were constructed at Balfour for rearing of West Arm kokanee.

Thirteen large Queesnel Lake rainbow were radio tagged and followed through to spawning. Over 600 rainbow trout from the Horsefly River were marked with external tags. These fish are being recaptured by anglers in Quesnel Lake and their numbers and seasonal movements will be determined.

An emergency northern pike survey of Summit Lake near Prince George involved fisheries staff from across the province as well as the federal Department of Fisheries and Oceans. Pike occur naturally in the Peace River system but not in the Fraser system. They represent a great threat to trout and salmon, both as predators on other fish and as carriers of a parasite. Two adult pike were found in Summit Lake and measures are being designed to prevent the spread of this species.

Okanagan Lake was stocked with 1.2 million kokanee fry. Assessment of kokanee stocks in the lake involved catching fish in nets by trawling and counting spawners. Creel census and aerial boat counts were also conducted on Okanagan Lake.

Small Lakes

The effectiveness of an aerator installed two years ago on St. Mary's Lake, on Salt Spring Island, was evaluated and improvements made to the diffuser design. An aerator on Langford

Lake, near Victoria, continued to provide improved water quality and better sport fishing.

The Habitat Conservation Fund provided improved spawning in Sayward area lakes through stream clearance and gravel additions to the lake tributaries. Artificial reefs were constructed from old tires to enhance bass habitat in numerous Vancouer Island lakes including Spider, Elk and Glen.

A questionnaire was mailed to over 9,000 Vancouver Island anglers requesting information on their lake fishing. A 60 per cent response to the questionnaire is being analyzed and will provide valuable catch and effort data for lakes managagement.

The promotion of recreational fishing on Vancouver Island lakes this year included production of a "Lakes Fishing Guide," available in tackle shops and tourist bureaus, and the marking of access points to lakes with signs.

Drought conditions throughout the southern interior of the province had a major impact on many small lakes and on most spawning and rearing streams. Ideal weather conditions during the winter resulted in minimal winterkill despite the low lake levels, but the year's loss of young fish from streams will mean decreased angling success in 1989 and 1990 when the fish would normally be caught.

Deep Lake, a small lake in the city of Kamloops, contained goldfish and was rehabilitated using HCF funding. A trout fishery will be established in the lake in 1989.

Platforms and wharfs were constructed at ten lakes in the Thompson-Nicola region to improve boat access. This JobTrac program was well received by anglers.

In the fall of 1987, a high-quality video on catch and release fishing was produced, and has since been aired provincially on the Knowledge Network and many community TV Stations.

A deep water withdrawal system was constructed at the Whiteswan Lake spawning channel, in the Kootenays, to provide cooler water to the channel during the rainbow trout spawning period.

A relatively new method of estimating angling activity was conducted on 80 Cariboo lakes, with most intensive effort on Chimney, Fawn, Dugan and Dragon Lakes.

In the Peace region, ten JobTrac workers conducted eight creel surveys, erected "stocked fish" signs, improved access and removed shoreline debris from stocked lakes. A lake aerator was installed in Beaver Lake, near Fort Nelson, and a walleye shoal spawning area was created in North Cameron Lake.

Twenty lakes in the Okanagan region were assessed to determine the abundance, age and growth rates of fish. Aerial boat counts were carried out on 111 lakes over a two-month period. Seven coarse fish barriers constructed in previous years were inspected, and access was improved to spawning areas on four tributary streams to benefit fish populations and lake angling. Freshwater shrimp were transplanted into one lake as an added food source for fish. A dam was constructed on the outlet stream of Echo Lake to raise the lake level and increase the shoal area and food production for trout.

Anadromous Fisheries

In 1987-88, 31,263 anglers purchased steelhead licences. In 1986-87 the total steelhead catch was 188,417 fish — a record high. The number of days anglers spent fishing for steelhead was also an all-time high of 279,505 angler days. Exceptional steelhead catches in recent years are a result of increased stock abundance, many hatchery fish in some rivers, and repeated captures of released fish. Hatchery fish made up almost 27 per cent of the steelhead catch across the province. The Chilliwack/Vedder River was again the most heavily fished stream in the province and also reported the most fish caught, followed by the Stamp, Bulkley, Skeena, and Dean rivers.

Wild steelhead stocks have rebounded in most Vancouver Island streams, as has the level of angler use. Historic high catch levels are being reported for both the Island and Lower Mainland. Much of this can be credited to anglers' support of catch and release as well as a successful hatchery program on many steelhead streams.

A diversion screen on the Salmon River, on Vancouver Island, was operational in 1987. This allows the downstream movement of steelhead smolts across the B.C. Hydro diversion which acted as a fish barrier as it redirected Salmon River water to the Campbell lakes for power generation.

The Nimpkish River was examined and found to have far fewer than the expected number of steelhead fry and parr. Since much good fish habitat in the Nimpkish is presently unused, future stocking holds some promise, although this low nutrient stream is unlikely ever to support large runs of steelhead.

Other rivers examined this year were the Keogh, Chilliwack/Vedder, Squamish, and Silverhope, which showed adequate abundance of steelhead fry. Fish stocks remain low in the Coquihalla, because of habitat degradation.

The first structured sampling of the Thompson-Nicola steelhead populations was completed in 1987 following the emergency closure of the sport fishery in October, 1986. The catch and release regulation ensured a good spawning escapement which should result in improved steelhead returns in future years. Stream clearance on tributaries of the Coldwater and Nicola rivers opened several kilometres of stream not previously accessible for spawning and rearing of Thompson River steelhead.

Improved angling for searun cutthroat trout in the Big Qualicum, Little Qualicum and Oyster rivers has resulted from a successful fish culture program. Good fisheries now exist in the lower river areas, estuaries and along the adjoining ocean shorelines. Malaspina College has initiated a fish culture program for searun cutthroat trout in small Nanaimo area streams.

Information brochures on Lower Mainland waters were produced covering a range of subjects including sturgeon management, stream protection, angler access, angler ethics, and urban fisheries. The storm drain marking program continued to inform urban people about the value and sensitivity of small streams in their community.

Commercial fishery interception of Thompson, Dean and Skeena river steelhead stocks continues to be a problem. Radio tagging and monitoring of steelhead is being carried out to observe their migration through the commercial salmon fishery, and the information collected will be used in negotiations with the Department of Fisheries and Oceans to increase the steelhead escapement for anglers.

Inland streams (stream resident fish stocks)

Hatchery brown trout released in the Upper Cowichan River, on Vancouver Island, are showing good survival and contributing to the sport fishery.

An examination of the Horsefly River to determine the number of trout fry present and the areas of the river they use resulted in more conservative regulations on Quesnel Lake and its tributary streams, to protect these late maturing rainbow stocks.

An intensive management plan was developed for the Stellako River, and an assessment of suitable habitat and juvenile fish abundance was made of the Kettle and Similkameen rivers in the Okanagan region.

Social and Economic Benefits

Analysis of economic information from the 1985 National Survey of Sportfishing in Canada was completed this year. Freshwater anglers in British Columbia spent over $300 million in pursuit of their sport, in 1985. These expenditures supported over 5,200 years of fulltime employment, $110.5 million of household income and $174 million of provincial gross domestic product. It is estimated that $32 million in revenue was provided to the provincial government through angling licence fees and taxes.

A review of the policy and legislation on angling guides is underway to provide better standards and direction for the guiding industry while maintaining high quality fishing opportunities.

A study of marine and freshwater sportfishing lodges and resorts in the province provided the first assessment of the tourism potential of the freshwater sport fishery. The study report contains information on the present extent and state of the lodge and resort industry, constraints to operation, and recommendations regarding future development.

The movement and transplant of live fish or aquatic invertebrates in the province is of major concern, since unauthorized transfers can have disastrous effects on native trout and salmon stocks. In 1987, 512 transplant applications were reviewed by the federal/provincial Transplant Committee. Of these, 499 were approved and 13 rejected.

Raising of live freshwater fish (other than tropical aquarium fishes) for commercial or personal use requires a Fish Culture Permit. In 1987-88, 209 such permits were issued comprised of 140 for rainbow trout, 16 for common carp and rainbow trout (in the Lower Mainland only), 2 for Arctic char, 40 for marine trout and salmon (including 7 for Atlantic salmon), and 11 for research or educational purposes.

FRESHWATER BASIC ANGLING LICENCE SALES 1985-1988

	1985/86	1986/87	1987/88
B.C. Residents	282,939	290,728	305,026
Other Canadians	38,830	43,648	43,848
Non-Canadians	38,370	40,395	40,574
TOTAL	360,139	374,771	389,448

FIVE-YEAR SUMMARY OF FISH STOCKED (INCLUDING KOKANEE EGGS)

Year	Provincial Facilities	Federal and Public Involvement Facilities	Grand Total
1983	9,180,405	953,522	10,133,927
1984	10,921,846	1,068,579	11,990,425
1985	11,987,278	2,114,047	14,101,325
1986	11,258,551	2,747,605	14,006,156
1987	11,342,542	1,834,703	13,177,245

Wildlife Management Program

The goal of the Wildlife Management Program is to manage the wildlife resources of the province for the benefit and enjoyment of our people, by maintaining an optimal balance between ecological, cultural, economic and recreational needs.

The objectives of the program are:

1. To maintain and enhance wildlife and wildlife habitats, and thereby ensure an abundant, diverse and self-sustaining wildlife resource throughout British Columbia.
2. To maintain, enhance and promote opportunities to appreciate, study and view wild species in their habitats.
3. To maintain, enhance and promote recreational opportunities to hunt game species in their habitats.
4. To facilitate commercial uses of wildlife.
5. To protect people and their property from intolerable levels of danger, damage or harassment by wildlife.

Legislation Administered

Wildlife Act and Regulations
Migratory Birds Convention Act and Regulations (Canada)
Game Export Act (Canada)

Birds, Endangered Species and Non-Game Wildlife

First drafts of regional plans for non-game species were prepared this year.

The Ministry continued to have representation on the Committee on the Status of Endangered Wildlife in Canada. The Convention on International Trade in Endangered Species of Wild Fauna and Flora was administered and 738 export permits issued.

Four young bald eagles were taken from nests and shipped to California for reintroduction to the wild to augment an endangered population. Other transplants included 358 Canada geese from problem areas in the Okanagan to the Central Interior, and sharp-tailed grouse from the Central Interior to Montana to augment declining populations.

Surveys of nesting eagles were conducted in the Lower Mainland and surveys of spotted owls continued there.

Production of British Columbia's one white pelican colony was monitored. Most of the 149 young produced were tagged or banded.

A paper on the status and management of Peale's peregrine falcon was published, and distributed as background for the public inquiry conducted in February and March.

Field work was done on the Vancouver Island marmot to try to determine minimum viable population size.

Fifty-one young raptorial birds were taken under permit by residents for falconry use in B.C.

Inventory of spotted bats continued, with 35 individuals being located in the Okanagan. A reconnaissance of 27 old mines and caves was made to locate wintering bats.

A draft key to the identification of small mammals in the Lower Mainland was prepared.

Two papers, on jurisdiction of wildlife and on managing terrestrial vertebrates, were prepared and published.

Ungulate Management

Over 30 ungulate habitat enhancement projects were initiated during the year, involving range improvement for deer, elk, moose, caribou and mountain sheep. Also transplants of elk, caribou, mountain goat and mountain sheep were made in several areas of the province to re-establish or supplement populations. Ungulate populations mainly remained stable or increased during the year.

Further modifications were made to the Ungulate Inventory Data Base system and work was initiated on the development of sightability correction factors for population surveys of elk (East Kootenay) and deer (Peace River). The second year of a three-year program to evaluate the effectiveness of Hunter Observation Booklets was carried out also.

Wolf predation continued to have a significant impact on ungulates in northeastern B.C. and on Vancouver Island. Some wolf control measures were ongoing in these areas in an attempt to reduce predation on ungulates.

Estimated harvests for the 1987/88 hunting season are 32,663 deer, 13,221 moose, 2,821 elk, 745 caribou, 1,010 mountain goat, 565 mountain sheep. These figures include the results from 22,801 hunts made available through the Limited Entry Hunting regulations during the year.

A number of ungulate management workshops and conferences were attended by Ministry wildlife managers during the year. Of particular importance to ungulate management in the province was a deer workshop held June 9–10, 1987 in Surrey, and a caribou workshop held November 3–5, 1987 in Williams Lake.

During the year provincial representatives also participated in a national Wood Bison Recovery Team. A preliminary publication entitled "Status Report of Wood Bison in Canada, 1987" was prepared as a result of the recovery team's efforts.

Carnivore and Problem Wildlife Management

Wolf Management

Wolf population reduction was undertaken on Vancouver Island, in the Quesnel Highlands and in the Muskwa area of northeastern B.C. Technical reviews of these control programs are underway. The need for additional wolf control in these areas will be assessed during the technical reviews.

Problem Wildlife

The number of wildlife-related livestock complaints decreased in 1987-88 year, as did the number of predators removed as a result of livestock complaints. However, the total number of livestock lost increased, largely due to predation by wolves. These results seem to suggest that although depredation problems are decreasing provincially there are still local situations where wolves are having considerable impact.

Wolf numbers are increasing provincially. This may result in a greater number of depredation problems with livestock producers. The Ministry, in cooperation with the B.C. Trapper's Association, has developed a program of continuing education for licenced trappers that includes wolf trapping. This program will result in a large number of licenced trappers attaining the skills to trap wolves. Close cooperation among Ministry staff, local trappers and livestock producers should result in depredation problems being dealt with quickly and efficiently.

Trapping

The results of an economic survey of trapping conducted by the ministry revealed that the average B.C. trapper earned over $1500 net revenue during the 1986/87 fur year.

Approximately 220 students completed Trapper Education Program courses during the year. As well, a program of continuing education for licenced trappers was developed this year. Initial training sessions were held in Smithers and Nelson and were very well received. These courses will be greatly expanded in coming years.

The ministry renewed its commitment to fur management by initiating the development of species management guidelines, undertaking a number of research initiatives, and beginning a furbearer inventory program. The ministry also continued its financial commitment to the development of humane trapping systems by supporting the research undertaken by the Fur Institute of Canada.

Commercial Game Farming

Cabinet approved the expansion of game farming in British Columbia on May 28, 1987 to allow for the farming of bison and fallow deer on fenced private property.

Game farming means the captive rearing of game animals for commercial purposes on private fenced land or private lands with physical barriers which limit the escape of animals. Hunting of game farm animals is not allowed.

Game farming of reindeer was approved-in-principle on February 15, 1988 but was put on hold while environmental factors were being investigated.

A total of six bison farms and eleven fallow deer farms were established by March 31, 1988, with an estimated 500 head of bison and 400 fallow deer occupying those farms.

Biometrics

Summary Statistics Data Base

The Summary Statistics Data Base, implemented in 1984/85, is an integration of several major provincial data systems that acquire and process information on hunter effort and animal mortality. The Wildlife Branch continued to enhance this data base during the 1987/88 fiscal year. The ministry's computer communication network allows regional staff immediate access to the data base, providing historical information back to 1976 for trend analysis, and current data for ongoing

management activities. The Summary Statistics Data Base is updated frequently during the year to ensure that the latest animal and hunter data are available for wildlife managers.

Tooth Return Program

Hunters submitted 7,500 deer, moose and elk teeth in the continuing 'Tooth for the Truth' program. The program supplies valuable information on the age of harvested animals. Respondents are told the age of their animal and receive a unique jacket crest as a token of appreciation for their assistance.

Limited Entry Hunting Draw System

The 1987 Limited Entry Hunting Draw computer system for fall hunts handled 87,716 applications (16 per cent increase over 1986), assigning 22,874 authorizations for 8 species of animals in 50 areas involving 610 hunts. The smaller Limited Entry Draw for Spring, 1988 grizzly bear hunts in the Kootenays handled 1,370 applications for 317 authorizations. The Limited Entry system also incorporates a mail questionnaire to all deer, moose and elk hunters following each hunting season.

B.C. Resident Hunter Number System

The B.C. Resident Hunter Number system, incorporated in 1982, now has some 270,000 individuals recorded as eligible to hunt in British Columbia. It maintains a record of names, addresses and licences purchased each year, and provides the linkage between several major wildlife harvest data systems.

Annual Hunter Sample

The annual Hunter Sample questionnaire was mailed to some 80,000 hunters to determine their hunting activity and success during the 1986/87 hunting season. Response rates averaged 77 per cent. Estimates of harvest by B.C. resident hunters were produced for major big game, waterfowl and upland game bird species.

Compulsory Inspection

The Compulsory Inspection system recorded some 3,000 individual reports of harvest of cougar, grizzly bear, mountain sheep, caribou and mountain goat throughout the province, and elk and wolf in some areas, by both resident and non-resident hunters. The Compulsory Inspection system requires all hunters to report the harvest of these species to ensure complete data are available to support the intense management activities required in some areas.

Research and Development

The wildlife research program was conducted and funded cooperatively with a variety of agencies, in both the government and private sectors. Among the participants were the Ministry of Forests and Lands, the Spatsizi Association for Biological Research, several forest companies, the U.S. Fish and Wildlife Service, and the Universities of British Columbia, Simon Fraser, Saskatchewan, and Victoria.

Integrated Wildlife/Intensive Forestry Research Program

The IWIFR Program in its second five-year phase, completed its seventh year investigating the impact of intensive forestry on habitat needs of blacktailed deer and Roosevelt elk on Vancouver Island.

The primary directions of Phase 2 are development of integrated planning tools, communication and training, and operational trials using Phase 1 findings. Over 250 wildlife and forestry individuals attended training sessions, and many other presentations were made. Several trials for winter range creation were set up with industry support. Work on planning tools was delayed by staffing and equipment problems.

Coastal Grizzly Project

The sixth year of the coastal grizzly project was spent verifying the applicability of the research results from the Kimsquit watershed to other locations on the coast. Two major systems were visited during extended field trips, the Toba and the Klinaklini River systems. These systems also offered an opportunity to collect grizzly food productivity information in a wide variety of logged areas of different ages. Follow-up work continued in the Kimsquit to confirm bear use of security cover adjacent to a salmon spawning channel, and to monitor population change.

Funding assistance ($25,000) to help cover costs of producing a management handbook entitled "Integration of grizzly bears and industrial forest development in coastal British

Columbia" was obtained from Wildlife Habitat Canada.

Two major reports were produced: a summary of the project's use of the Ministry's CAPAMP system, and a thesis detailing grizzly bear habitat classification and habitat selection as related to food quality and quantity.

Wildlife Habitat Handbook Project

This project aims at producing computer and written tools to help forest and wildlife managers assess the impacts of proposed forest development on all classes of vertebrates. Progress made during 1987/88 included:

1. Completion of species notes and accompanying graphics.
2. Completion of a report describing habitat classes for the province.
3. Completion of habitat suitability models for 144 species.
4. Design of a prototype system using computerized forest cover data bases to accumulate habitat input and computerized habitat-species models. The project will be completed during the next fiscal year.

Spatsizi Wildlife System Project

Last year was spent mainly in planning the next phase of this cooperative project with the Spatsizi Association for Biological Research. A modelling workshop was held to help with this planning.

Flathead Grizzly Project

The objective of this project, which is entering its ninth year, is to examine the habitat and population ecology of grizzly bears in the Flathead River drainage, in order to improve management of the species. Specific concerns relate to the impact of resource development on grizzlies and their habitat requirements, and on the impact of hunter harvest. During 1987/88 several papers were written and accepted for publication. Several new projects were initiated including black bear/grizzly bear interaction.

Ecology of Southern and Central Interior Caribou

Three study areas were active this past year: west-central (Tweedsmuir-Entiako and Itcha-Ilgachuz-Rainbow Mountains), the Quesnel Highlands, and Wells Gray Park. For the first area, the final year of field work was completed. Winter movements and habitat use were documented, along with changes in population characteristics. Survival of caribou calves continues to decline. In the second area, the final year of field work was completed. Radio-collared caribou and wolves were located at 1–4 week intervals to determine movements and broad habitat use patterns. Final write-up of the project is planned for the coming year. In the third area, Wells Gray Park, radio-collared caribou were also followed to monitor seasonal movements. This latter study is funded by Park Programs. The others are cooperatively supported by several organizations, including the Wildlife Program, Park Programs, B.C. Forest Service, and the forest industry.

Nimpkish Valley Wolf/Deer Project

This project began in 1982/83, with the objective of determining the impact of experimental wolf control on deer populations in the Nimpkish Valley, Vancouver Island. Results to date indicate significantly increased survival of deer in the wolf removal area compared to the non-removal area. A report that will present all data, conclusions, and recommendations is presently nearing completion.

Research Needs For Habitat Enhancement

A study is being carried out to define research and development projects required to meet the needs of wildlife and habitat managers. A problem analysis is being conducted, centered on the Okanagan subregion, to document enhancement activities to date, describe problems and opportunities as seen by the manager, assess the relevance of the existing literature, and identify how best to spend research time and money to meet research needs. At the start of the project, biologists were interviewed and presented with habitat enhancement data forms on which to record relevant data extracted from various types of documents.

Carnivore Species Management Review

In conjunction with the preparation of long-term species management statements, a program was initiated over the 1986/87 winter to review current management strategies for all large predators. This review was continued

through 1987/88. It is designed to provide a program up-date on the basis of current knowledge, against a background of the ecological, social and economic realities of the forthcoming decade. The underlying principle for the review is to secure the long term survival of all native predatory mammals within the province in relative balance with other species, and for the benefit of the hunting and non-hunting public. Special attention is being paid to grizzly bears and lynx due to their vulnerability to overharvest. Regulation changes and research programs will be recommended as necessary to protect all species.

Cougar Ecology

This study concerns the ecology of cougar living in the vicinity of the Junction area California bighorn sheep. Collection of data on the cougars' home range, prey selection, habitat utilization, and population structure was begun last year. The study is necessary in order to understand the cougars' importance as a mortality factor on the bighorn sheep, particularly rams. The Junction area is the major source of California bighorn for transplants to other parts of the province and to the United States.

Furbearer Research

The Wildlife Branch initiated a furbearer research program in 1986/87. Initially two separate projects were undertaken: the use of second growth forests by pine marten, and the effects of herbicide application on small mammals. Both projects were conducted on Vancouver Island. In 1987/88 a third project was begun, to look at developing habitat suitability models for marten in the north-central interior. The project is located near Smithers.

Health of Wildlife

A long-term project on wildlife health continued, focussing on the identification of diseases and parasites of importance to wildife populations, those of public health significance, and those of possible significance to game-farmed species. A survey of Fraser Valley, Okanagan and Thompson-Nicola carnivores was carried out for evidence of exposure to sylvatic plague, with negative results.

Technical Reports: 1987/88 Publications

Wildlife Reports

R-13 Nest tree selection by primary cavity-nesting birds in south-central British Columbia. D.G. Keisker. June 1987. 67 pp.

R-14 Perspectives on inventory of caribou in Britsh Columbia. D.F. Hatler. July 1987. 104 pp. (Also printed as Spatsizi Association for Biological Research Rep. No. 4).

Wildlife Bulletins

B-52 Wolf management in British Columbia: the public controversy. R. Hoffos. May 1987. 83 pp.

B-53 Habitat selection by black-tailed deer on Vancouver Island: Job completion report. R.S. McNay and D.D. Doyle. 1987. 90 pp. (Also printed as IWIFR-34).

B-54 Shrub burial by snow deposition in immature coastal forests. F.W. Hovey. 1987. (Also printed as IWIFR-35).

Wildlife Working Reports

WR-22 Progress report — year 4 — 1985; working plan — year 5 — 1986. Coastal grizzly research project. A.N. Hamilton, W.R. Archibald, and E. Lofroth. February 1987. 90 pp. (Also printed as WHR-26).

WR-23 Critical habitats of caribou (Rangifer tarandus caribou) in the mountains of southern British Columbia. K. Simpson, K. Hebert, and G.P. Woods. February 1987. 13 pp.

WR-24 Impacts of hydro-electric reservoir on populations of caribou and grizzly bear in southern British Columbia. K. Simpson. February 1987. 40 pp.

WR-25 The effects of snowmobiling on winter range use by mountain caribou. K. Simpson. February 1987. 15 pp.

WR-26 Quesnel Highlands wolf control project. D. Hebert. January 1987. 10 pp.

WR-27 Muskwa wolf management project of northeastern B.C. 1986-87 annual report. J.P. Elliott. April 1987. 20 pp.

WR-28 Vancouver Island wolf control project. Year 1 progress report D. Janz. July 1987.

WR-29 Habitat survey of the Mackenzie Heritage Trail corridor. V. Hignett. June 1987. 21 pp. plus 5 maps.

WR-30 A proposal to manage coyote and cougar populations of the Junction Wildlife Management Area. D. Hebert. September 1987. 11 pp.

Habitat Management

The Habitat Management Section serves five major functions: 1) habitat protection, 2) land management, 3) planning, 4) wildlife viewing, and 5) fund administration.

Habitat Protection

Regional staff processed approximately 20,000 referrals, and conducted field inspections of development proposals with the potential to impact wildlife habitat. Recommendations were made to other government agencies and negotiations with developers were undertaken to reduce the impact of developments on wildlife and its habitat. Province-wide computerization of the ministry referral system was initiated.

Forestry

Forestry issues affecting wildlife habitat that were addressed included the Forest Resources Development Agreement, forest pesticide use, Timber Supply Area planning, the Emergency Bark Beetle Program, silvicultural referrals, and coordinated access management. Data collection on forest herbicide impacts on wildlife forage species continued. A preliminary model to predict herbicide impacts was drafted.

Development of provincial guidelines for the protection of wildlife trees was initiated last year. A provincial committee reviewed the guidelines and a wildlife tree policy will be drafted.

Mining

Environmental impact reports for a number of metal and coal mine proposals were reviewed under the Mine Development Review Process. Recommendations were provided to reduce impacts of mine developments on wildlife. Proposed changes in mining legislation were reviewed.

Highways

Wildlife vehicle collisions were monitored. Reports indicate that more than 3,000 animals per year are killed on highways, representing vehicle damage costs of nearly $5 million.

Land Management

The first Wildlife Management Areas in the province were designated on July 8, 1987 to commemorate Canada's Wildlife Centennial. The six areas total 17 824 ha in size.

Prime wildlife habitat totalling 2 300 ha was acquired using funds from the Crown Land Account cost-share arrangements with The Nature Trust.

The Wildlife Land Working Committee drafted policy, procedures and inter-agency agreements with respect to management of wildlife lands.

Habitat Management staff participated on the inter-agency Wilderness Liaison Committee, established to coordinate land use designations.

Appraisals and negotiations for land acquisition activities within the ministry were undertaken.

Contracts with The Nature Trust and Ducks Unlimited were signed and a number of joint land use projects were administered.

Planning

The Habitat Management Section continued coordination of the development of Regional Wildlife Plans. The first drafts of both the species and habitat statements are completed. A committee has been established to develop Provincial Species Statements and a Provincial Wildlife Strategy.

Wildlife Viewing

A plan was pursued to undertake an analysis of opportunities for wildlife viewing, funded through the Federal/Provincial Development Agreement of the Ministry of Tourism Recreation and Culture. The Habitat Management Section is working with the provincial Tourism and Parks agencies to develop viewing opportunities.

Habitat Conservation Fund

The Habitat Conservation Fund received revenue totalling $1.5 million from licence surcharges and other sources. Over 80 projects

to enhance fish and wildlife habitat were completed at a cost of $1.63 million. The B.C. Conservation Foundation continued to act as a general contractor for selected projects.

Public Conservation Assistance Fund

The Public Conservation Assistance Fund aided 23 projects in a variety of conservation, wildlife, and fisheries areas, providing a total of $50,000 to clubs and individuals throughout the province. The agreement with Wildlife Habitat Canada to supplement the fund by an additional $50,000 was continued.

Habitat Inventory

The Wildlife Habitat Inventory Section has four main functions:

1) Mapping important wildife habitat on the basis of terrain, soils, vegetation and wildlife ecology, and providing management recommendations.
2) Setting standards for habitat evaluation and inventory in government and the private sector.
3) Developing better habitat evaluation and inventory techniques.
4) Providing specialist advice on land management.

The inventory program was assisted by funding from several different sources, including the Habitat Conservation Fund, the private sector and other branches within the ministry.

Mapping Program

Habitat and capability maps provide the basis for habitat planning, management, and protection. This year 1:500,000 habitat maps for regional planning were completed for the province, as were four 1:50,000 ungulate biophysical maps for the Kamloops Lake area, and four for northern Vancouver Island.

Mapping was initiated in two parks (Manning and Robson).

Setting Standards

Guidelines to monitor changes in wildife habitat effected through habitat improvement, such as prescribed burning or planting, were implemented on a trial basis.

Developing Evaluation and Inventory Techniques

Grizzly bear habitat mapping was developed in two northern areas as a basis for setting seasons.

Development of a computer mapping technique continued in conjunction with the Surveys and Resource Mapping Branch, and satellite information was tried as a basis for automated mapping.

Providing Specialist Services

Assessment and Planning Branch was assisted in evaluating wildlife values for a subregional plan in the Nechako Valley.

Technical Publications

Three papers were presented at a symposium sponsored by the Federation of B.C. Naturalists.

1. Demarchi, D.A. (1987). Defining British Columbia's Regional Ecosystems.
2. Fuhr, B. (1987). Biophysical Mapping — The Skagit Example.
3. Pendergast, B.A. (1987). Wildlife Habitat Inventories, Development of a program.

CORE Program

Approximately 3,500 students successfully completed the Conservation and Outdoor Recreation Education program. Plans for extensive revision to CORE were completed, to be implemented in 1988. Changes will encourage participation by larger numbers of students and will increase availability of courses provided by instructors.

Regulations Section

The Regulations Section undertook the development of an automated system to set regulations, employing computer and word processing equipment available in ministry regional and Victoria offices. Initial steps resulted in use of word processing to transmit proposed changes, saving much typing and handling of separate documents during the regulation setting process beginning in January and ending in March each year. Time saved permitted processing of legal forms and the hunting regulation synopsis within desired time frames.

Limited Entry Hunting Demand 1987/88

Species	Authorizations Available	Applications Received
Caribou	163	846
Elk	7,852	25,119
*Grizzly Bear	390	2,367
Moose	6,971	29,491
Mountain Goat	2,024	7,291
Mountain Sheep	342	3,994
Mule Deer	3,499	11,761
Whitetailed Deer	1,950	8,137
Total	23,191	89,086

* includes draw for spring 1988 hunts. Draw held in October 1987.

RESIDENT HUNTING LICENCE SALES 1985-1988

	1985/86		1986/87		1987/88	
	Number	$ Value	Number	$ Value	Number	$ Value
B.C. Resident	119,260	$1,669,640	117,314	$1,642,396	114,669	$1,790,116
Senior Citizen	10,976	10,976	11,286	11,286	12,169	12,169
Black Bear	15,238	121,904	17,138	137,104	19,006	152,048
Caribou	1,154	23,080	1,138	22,760	1,236	24,720
Cougar	461	9,220	413	8,260	509	10,180
Deer	111,897	895,176	106,090	848,720	121,467	971,736
Elk	17,502	350,040	16,933	338,660	16,517	330,340
Grizzly Bear	1,003	70,210	1,041	72,870	1,218	80,012
Moose	43,891	877,820	46,526	930,520	48,509	970,180
Mountain Goat	1,768	53,040	1,781	53,430	1,804	54,120
Mountain Sheep	1,491	74,550	1,690	84,500	1,905	95,250
LEH Hunting Apps.	76,418	229,254	81,769	245,307	94,185	282,555
TOTAL	401,059	$4,384,910	403,119	$4,395,813	433,194	$4,773,426

NON-RESIDENT & NON-RESIDENT ALIEN LICENCE SALES 1985-1988

	1985/86		1986/87		1987/88	
	Number	$ Value	Number	$ Value	Number	$ Value
Non-resident alien	4,012	$361,080	4,321	$388,890	4,523	$485,190
Non-resident	592	8,288	635	8,890	1,177	18,832
Non-resident alien small game	288	11,520	411	16,440	421	21,050
Black bear	2,367	118,350	2,570	128,500	2,900	145,000
Caribou	455	54,600	495	59,400	537	64,440
Cougar	53	6,360	62	7,440	68	8,160
Deer	1,140	68,400	1,181	70,860	1,462	87,720
Elk	966	115,920	963	115,560	1,080	129,600
Grizzly bear	782	250,240	848	271,360	831	265,920
Moose	2,380	285,600	2,537	304,440	2,628	315,360
Mountain Goat	790	102,700	798	103,740	779	101,270
Mountain Sheep	414	124,200	394	118,200	374	112,200
Wolf	748	18,700	811	20,275	952	23,800
TOTAL	14,987	$ 1,525,958	16,026	$1,613,995	17,732	$1,778,542

Summary of guided hunter activity in the 1987/88 hunting season

Region	Number of Active Guide Outfitters	Number of Active Assistant Guides	Number of Guided Resident Hunters	Number of Guided Non-Res. Canadians	Number of Guided Non-Res. Aliens	Moose	Mountain Goat	Caribou	Deer	Mountain Sheep	Grizzly Bear	Black Bear	Elk	Cougar	Wolf	Upland Birds	Waterfowl	Other
1	6	20	0	4	130	0	0	0	11	0	4	108	6	1	0	1	0	1
2	4	8	0	0	15	0	0	0	0	0	0	12	0	0	0	0	0	0
3	11	21	0	1	87	4	11	0	11	6	0	28	0	7	0	0	11	2
4	37	221	2	23	819	18	103	0	70	8	20	151	226	1	0	3	3	3
5	67	129	19	5	713	221	26	9	89	8	17	61	0	5	2	209	0	2
6	58	180	6	11	817	328	140	95	9	62	52	218	0	0	37	78	13	5
7	91	375	11	32	1563	803	161	114	6	152	95	402	126	0	9	280	9	5
8	12	49	5	11	199	0	8	0	40	12	0	78	0	24	0	6	0	14
Prov. Totals	260	947	43	87	4262	1374	449	218	236	248	188	1058	358	38	48	476	70	31

*Some guides and some hunters were active in more than one region, hence the sum of the regional figures in some guide and hunter categories exceeds the number given for the province.

BRITISH COLUMBIA WILD FUR HARVESTS 1981-1987

Number of Pelts by Fur Harvest Year

Species	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
Beaver	14,895	11,815	12,666	13,297	13,668	19,513
Muskrat	27,606	21,580	25,328	14,841	10,693	13,088
Mink	4,086	4,110	4,165	3,183	2,832	3,311
Otter	702	429	543	673	650	654
Coyote	4,018	3,506	4,081	3,460	2,783	3,872
Fox	609	831	891	764	450	828
Wolf	194	184	186	232	156	201
Weasel	2,827	3,840	8,159	8,058	3,600	5,537
Wolverine	214	265	265	260	210	246
Skunk	34	22	60	23	55	15
Fisher	635	941	754	630	489	457
Marten	23,656	23,434	28,350	45,130	1,206	31,627
Lynx	5,463	6,264	2,760	1,668	134	1,050
Bobcat	231	184	215	271	24,909	238
Squirrel	33,949	79,348	87,375	31,663	29,573	26,535
Raccoon	1,473	667	791	978	1,337	757
Black Bear	295	382	368	364	343	421
TOTAL VALUE in $(Millions)	3.4	3.8	3.8	4.9	3.2	5.8

Estimates of Resident Hunter Harvest 1979 - 1987

YEAR	HUNTING	HARVEST										
	Licence Sales	Deer	Moose	Elk	Goat	Sheep	Caribou	Grizzly Bear	Black Bear	Grouse	Ducks	Cougar
1979	163088	29965	13045	1471	360	216	147	177	2731	478579	160307	150
1980	167879	36079	12486	1996	421	198	138	180	5670	306057	145549	117
1981	174088	35190	10752	1811	396	263	127	225	3247	214656	145713	106
1982	154143	34774	10906	2532	408	183	150	185	3180	258461	117564	130
1983	144669	29804	9613	3321	581	218	145	201	3557	179078	86007	120
1984	136930	32673	9196	4183	576	192	150	195	3531	133683	112150	160
1985	130236	27337	10214	3344	480	216	159	178	3061	186739	106563	100
1986	128600	29077	12076	3170	603	312	141	190	3262	238143	93664	139
1987	126838	32429	11957	2499	567	329	180	173	2280	453073	116550	113

Water Management Program

Objectives

The goal of the Water Management Program is to manage provincial water resources to maximize their contribution to the social and economic development and well-being of all British Columbians.

Objectives include:

1. Assured protection of licensed private rights and instream uses through allocation and regulation of the supply and use of surface water under the Water Act.
2. Reduced potential for property damage and loss of life due to flooding and erosion through runoff forecasting, snow surveys, emergency action, regulation of floodplain development, investigations for and implementation of flood and erosion protection projects, and inspection and maintenance enforcement for dykes and dams.
3. A high level of water resource quality for groundwater, fresh surface water and estuarine and coastal marine waters achieved through the establishment of resource quality objectives, water quality monitoring, watershed planning, the referral and consultative processes, and assistance in the control of nuisance aquatic vegetation.
4. An assured adequate level of water service to those supplied by privately owned utilities; regulation of water utilities, and provision of technical support including project management to funding ministries.
5. An adequate information base on the supply capability of surface water and groundwater resources through the collection, storage and analysis of data.
6. A high level of public health engineering support for the Ministry of Health through approvals and inspection of water supply sources, supply and treatment works, swimming pools and waste disposal systems.
7. A water management program which is managed cost effectively through planning, budgeting, fiscal control, program evaluation, asset control, effective communication systems, personnel system administration, administrative support services, a technical support system, and staff safety and training.

Legislation Administered

Water Act and Regulations
Drainage Ditch and Dyke Act
Dyke Maintenance Act
Libby Dam Reservoir Act
Water Utility Act
Utilities Commission Act
Land Title Act

Water Allocation and Regulation

Water Licensing

During this fiscal year, 1,029 applications for new water licences were received. By year-end a total of 2,120 applications were awaiting decision, of which 85 were the responsibility of headquarters office in Victoria, while 2,035 required action in the regions.

The responsibility for issuing water licences is shared by the comptroller of Water Rights and five regional water managers. During the year 304 licences were issued by the Comptroller, while 852 licences were granted from regional offices. Associated with the new licences were 354 new permits to occupy Crown land.

As of March 31, 1988, there were 38,162 active water licences on record, an increase of 199 from a year previous. Of these, 1,401 licences are under review for consideration of amendments to the rights granted. A total of 957 licenses were removed from active status, either due to abandonment by the licencee, cancellation by the comptroller, or replacement by another licence. Records maintenance activities in Victoria included the production of 516 new water licensing maps affecting 1,615 licences and installation of the maps in regional offices; plus processing of 3,088 licensee name or address changes.

Regional offices issued a total of 1,260 approvals under Section 7 of the Water Act during the period under review. The comptroller heard eight appeals from orders of an engineer and 24 appeals from licensing decisions of a regional water manager during the fiscal year. The Environmental Appeal Board heard 13 appeals from decisions of the comptroller during this period.

Power and Special Projects

The monitoring of major power utilities operations was continued, in particular the review of proposals and construction works undertaken by the B.C. Hydro and Power Authority in rehabilitating older projects which do not meet modern design criteria.

Reservoir operation monitoring, for maximum power and flood control benefits, was continued for B.C. Hydro, Alcan, and West Kootenay Power projects, and a proposal to raise the Seven Mile Reservoir on the Pend d'Oreille River to flood into the United States was reviewed. This raising is scheduled for May 1988.

Input was provided to a number of committees working towards agreement on power issues in the province. These issues included Columbia River Treaty downstream benefit calculations, the Alcan/B.C. government/federal government agreement on flow releases for fisheries, the Alcan/B.C. Hydro coordination agreement related to the Kemano Completion Project, the B.C. Forest Products Williston Lake weir proposal, and the City of Nelson request for additional water rights for their Kootenay River Plant.

Flood Damage Prevention

Runoff Forecasting

Forecasts of the total volume of runoff for the spring and summer snowmelt period were made for all major river basins in the province. Weather and stream-flow data were collected from many sources including the ministry's five automatic high level snow course and meteorological stations. These data were used in computer models to make short-term predictions of water levels and flow rates at various locations as required during the freshet. Below normal snowpacks and a warm spell at the beginning of May depleted much of the low level snow, resulting in lower than normal peaks on the major rivers in the province.

The flood warning system for the Squamish River was activated in the fall with weather, snow conditions and stream-flow data being collected and evaluated. Since the very dry late summer and fall delayed snow accumulation beyond the normal flood season, no flooding occurred.

Snow Surveys

During and prior to the snowmelt period, 1,221 snow surveys were carried out at the province's 249 permanent snow survey stations. The measurements were published in six issues of the Snow Survey Bulletin.

Two additional automated snow pillow stations were installed. One was located at Fidelity Mountain in Rogers Pass in cooperation with B.C. Hydro and the other at Great Bear in the Coquihalla Pass in cooperation with the Ministry of Transportation and Highways. The program now operates 15 automated stations, 4 independently and 11 in cooperation with other agencies.

Floodplain Planning

A total of 1,488 zoning bylaws, rural land use bylaws, requests for relaxation of bylaw requirements, official community plans and Crown land disposition referrals, and 1,208 proposed subdivisions were reviewed for floodproofing conditions. The major review of floodplain management policy initiated in fiscal 1987/88 was completed and approved by the Cabinet.

Floodplain Mapping

Floodplain mapping was completed for the following areas: Fraser River near Hope, Fraser River at Quesnel and Crawford Creek. Engineering studies in progress include Elk River near Elkford, Bella Coola River and Nicola River.

On December 3, 1987, an agreement was signed with the federal government regarding floodplain mapping to accelerate the production of maps and share in the costs of such work. The agreement provides for an expenditure of $5 million and is in effect for a period of ten years.

As a result of the signing of the agreement, a total of 35 areas involving 263 floodplain maps produced under the provincial program have been designated by the ministers. The steering committee, established under the terms of the agreement, has recommended an additional 9 floodplain areas involving 22 floodplain maps be designated by the ministers by September of 1988.

Dyke Maintenance

The purpose of the Dyke Maintenance Program, under the Inspector of Dykes, is to ensure the safety, proper maintenance and operation of all dykes in the province except private dykes as defined in the Dyke Maintenance Act.

During 1987/88, inspections were carried out on 273 km of dykes. Approximately 63 approvals for changes to dykes were investigated. Administration and operation of the Coquitlam Dyking District by the office of the Inspector of Dykes continued during 1987/88. Technical advice and information on dyking was provided to various dyking districts and the public.

Drainage

Applications for three new drainage projects were received during the third year of the current Canada/British Columbia Agri-Food Regional Development Subsidiary Agreement (ARDSA) 1985-1990. These bring the total number of drainage applications referred to the Water Supply and Drainage Section to 28. Seven applications were rejected and eight deferred; therefore, active projects total 13 with an estimated total value in excess of $13.0 million.

Two projects, including Pitt Meadows No. 2 dyking area, were approved for construction with a total value of about $800,000. Terms of reference for detailed feasibility studies by consultants were prepared for three projects.

Dam Safety

The Provincial Dam Safety Program covers more than 2,000 storage and diversion works, of which 146 are classified as major dams. Inspection of these major structures is a responsibility of the Victoria office, which carried out 76 regular and follow-up inspections during the 1987/88 fiscal year. During the same period, regional staff inspected 583 minor dams.

Using special instrumentation, the performance of 18 high hazard dams continued to be monitored. Underwater inspections were carried out at 11 dams and a report of each inspection was submitted to the appropriate regional water manager.

Extensive remedial works are in progress at John Hart and Cheakamus Dams to make them safer under revised seismic standards; studies are underway to strengthen one of the Jordan River dams. Other projects requiring review of performance including the W.A.C. Bennett and Peace Canyon Dams of the Peace River, and a slide stabilization program in an area of the Kinbasket Reservoir near Mica Dam.

Dam owners continued their review of older, smaller power projects, that may not meet current design standards, particularly with respect to spillway capacity and resistance to earthquakes. They have also been advised to prepare operating and maintenance manuals along the lines of a guide issued by the ministry. The manuals are designed to provide reliable operating instructions and technical data on specific structures, particularly at times of staff turnover, or when operating staff are not available during an emergency. Some 85 per cent of the owners were reported to be actively engaged in preparing manuals, and ten manuals were presented for approval. B.C. Hydro has completed such documents for 30 of their dams.

Channel Clearing and River Protection Assistance

During the year, many requests for assistance with river protection works were received while some 17 projects costing a total of $52,000 were completed. Local landowners and municipalities contributed 22 per cent of this cost. Three stream clearing projects were undertaken at a cost of $31,000. Nine major dyking projects were completed under the dyking program costing a total of $3.4 million.

Dredging of the outlet of Nicola Lake was commenced under an ARDSA cost-sharing agreement and will be completed during 1988. The Pemberton Valley dyking project to protect the Village Area and improve flood protection elsewhere was concluded at a total cost of $1.9 million, the Kelowna Creek Diversion Culvert project was completed at a total cost of $2.6 million and a further phase of the Duncan area dyking program was concluded at a cost of $1.05 million.

Fraser River Flood Control

This program, carried out under a federal-provincial agreement signed in 1968, and as now amended, allows for an expenditure of $161 million, shared equally by the two senior governments. Expenditures to March 31, 1988, totalled $130 million while the expenditures for the fiscal year 1987/88 amounted to $5.1 million. Ongoing projects include Kent, Pitt Meadows, Dewdney, Glen Valley, Delta and Chilliwack.

Special Studies

Investigations were carried out and reports prepared regarding a number of landslide, special flooding and other natural hazard areas throughout the province. There was also continued monitoring of bedload movements on

several creeks on Howe Sound which are prone to debris torrents.

A study of general coastal erosion rates and flood levels was also completed.

Resource Quality

Water Quality

There was continued emphasis on the preparation of water quality criteria and objectives. Water quality criteria are safe levels of contaminants for various classes of water use. Water quality objectives are the criteria adapted to protect the most sensitive water uses in a specific water body. The objectives guide waste and water management, and establish a reference against which the state of water quality at a particular site can be checked.

During 1987/88, surface water quality criteria were established for aluminum, copper, lead and microbiological indicators. This brings the total number of completed criteria documents to nine. Work is in progress on criteria for nine other characteristics of water quality. Provisional water quality objectives were completed for three bodies of water, bringing the total number of sub-basins for which water quality objectives have been set to 21. Work is proceeding on 14 other bodies of water, four of which are in the marine environment.

Partial information on how closely the water quality objectives were met in 1986 was reported on in 1987. This year also saw the start of a comprehensive monitoring program to verify more completely how well the objectives already established were being met.

This was the second full year of operation of a water quality monitoring agreement between the governments of Canada and British Columbia, entered into in October 1985. It provides for long-term monitoring of trends in water quality at stations throughout the province. The number of stations at which operating costs are shared equally by the two governments increased from 23 to 25.

Trends continue to be monitored at six lakes in the Lower Mainland and on southern Vancouver Island to determine the future effects of acid precipitation. Over 800 lakes have been tested for acid sensitivity to date, including 42 in 1987.

The groundwater program provided technical input and undertook investigations and otherwise contributed to 26 environmental impact assessment studies for major developments, 12 groundwater protection studies related to natural phenomena, waste disposal and accidental spills. Under the groundwater monitoring and assessment program sampling was undertaken in the Langley-Abbotsford and Osoyoos areas and 13 shallow monitoring wells were constructed near Abbotsford.

As a result of the Policy and Procedures for Community Watershed Planning" prepared by the ministries of Environment and Parks and of Forests and Lands in 1984, Integrated Watershed Management Plans were finalized for three community water supply watersheds with critical multiple resource use issues. Plans are in the process of being prepared for nine other watersheds.

Divers from the dam safety unit undertook 9 underwater surveys of waste disposal facilities and provided 9 reports to regional waste managers.

Littoral Resources

In 1987, about $334,500 was allocated to provide 75 per cent of operational costs of aquatic plant control projects implemented by local agencies in high-use recreational areas of 14 British Columbia lakes. In one of these lakes (Swan Lake, near Dawson Creek) native vegetation was harvested.

Eurasian water milfoil was controlled by methods including harvesting, derooting, diver operated dredging, hand pulling and bottom barrier applications in the seven mainstem Okanagan Valley lakes, Shuswap and Mara Lakes and Shuswap River, Christina and Champion Lakes in the Kootenay Region, Cultus Lake and Long Lake (Vancouver Island). Approximately 273 hectares of littoral area were treated during this fiscal year.

Major expansion of Eurasian water milfoil was documented in the Salmon Arm area of Shuswap Lake in 1987, while intensive management minimized further spread to other parts of this lake. This plant was reported for the first time in the Shuswap River upstream of Mara Lake, apparently introduced by boaters. Surveillance efforts and public information distribution were continued, particularly in the Kootenay Region and on Vancouver Island; no new Eurasian water milfoil infestations were reported in these areas.

In 1987, activities related to environmental monitoring and regulation of marine finfish aquaculture were expanded by Unit staff. Bi-annual water quality monitoring of Sechelt Inlet was transferred from the Ministry of Agriculture and Fisheries and implemented in September, 1987.

Water Quality

Groundwater

During the fiscal year 2,020 water well records were collected from drilling contractors; a total of 1,148 water well records were completely processed.

A total of 2,711 general enquiries for groundwater information were answered and water level fluctuations were monitored in 143 observation wells located in various parts of the province. Five new observation wells were added to the network.

Under the groundwater program, 15 assessments were completed, involving groundwater supply potential and groundwater use conflicts, together with 7 well capacity reviews for community water supplies and 2 evaluations for regional water management plans. Over 169 copies of two publications on groundwater development and well construction guidelines were distributed on request.

Surface Water

The number of hydrometric stations operated under the federal-provincial agreement increased from 571 to 576 during the 1987/88 year. This resulted from four deletions and nine additions.

Water Supply Projects

Supply Project Feasibility Studies

The current Canada-British Columbia Agri-Food Regional Development Subsidiary Agreement (ARDSA) 1985–1990, which was signed in July 1985, provides $40.0 million for the development of the agriculture in B.C. over a five-year period. Under Program 2, $17.5 million is available to assist irrigation, drainage, soil conservation, and water conservation projects.

Feasibility studies for water supply and irrigation projects are normally initiated through requests to the Ministry of Agriculture and Fisheries for assistance under the ARDSA program. By the end of the 1987/88 fiscal year, a further seven applications were received bringing to 44 the total number of water supply and irrigation projects referred to the Water Supply and Drainage Section.

Thirteen projects were rejected and six withdrawn; therefore, active projects total 25 with an estimated total value of about $15.3 million.

Preliminary engineering assessments were completed for 11 potential projects and terms of reference for detailed feasibility studies by consultants were prepared for two projects. Groundwater investigation programs by consultants were initiated for two projects; one was completed and the other is still in progress.

Water Supply Project Implementation

Final design and construction supervision of ARDSA projects are now largely being carried out by consultants, with project management and monitoring by the Water Supply and Drainage Section. A further four projects were approved for construction during the 1987/88 fiscal year bringing to 10 the total number of approved water supply and irrigation projects. The estimated total value of approved projects is $1.0 million.

Engineering services were also provided to the Recreational Fisheries Branch for Phase 4 expansion of the Hill Mackenzie Hatchery near Revelstoke and for the Fraser Valley Hatchery at Abbotsford.

Community Water Supplies

Authority to construct and operate a privately-owned water system for the supply of water to the public for compensation is provided through a Certificate of Public Convenience and Necessity issued by the Comptroller of Water Rights under the Water Utility Act and the Utilities Commission Act. In the 12-month period ending March 31, 1988, 32 applications for certificates were received. A total of 35 certificates were issued during the year.

Seventy-three orders of various kinds were made by the Comptroller and 22 new or amended tariffs were examined and accepted for filing.

Public Health Engineering

Certificates of Authorization for the construction of public waterworks systems and swimming pools under the Health Act are issued by Public Health Engineers on behalf of the Minister of Health. For the year ending March 31, 1988, 582 waterworks and 133 swimming pool certificates were issued. Eleven provisional waterworks and 22 septic tank certificates were issued. A new Risk Analysis Program, which commenced this year, will provide a subjective rating of the seriousness of the problems relating to drinking water quality and system operations.

Public Health Engineers have been the prime movers of an independent program to certify water and wastewater operators and to classify water and wastewater facilities. To date there have been over 800 operators certified and 140 facilities classified.

Resource Management Projects

Regulation of Okanagan Main-Stem System

Inflow to Okanagan Lake was only 52 per cent of normal during the spring freshet, with the result that the lake peaked at 16 cm below its full level. The dry summer, fall and winter that ensued meant that releases for fisheries were lower than ideal, although all irrigation and domestic users on the main-stem had sufficient water. The carry-over storage into 1988 is considerably lower than usual.

Nicola Lake Dam

Nicola Lake Dam was successfully filled during the freshet. Because of extremely low inflow to the lake during the remainder of the year, in the lake fell to such a low level that ideal fisheries flows could not be released during the winter. A dredging program upstream of the new dam to be undertaken in 1988 should ensure that sufficient water is available in subsequent years.

Vedder River Floodway

The area between the setback dykes is administered by the Vedder River Management Committee. Monitoring of river sedimentation continued.

The dykes and floodboxes constructed under the Fraser River Flood Control Program are being operated and maintained by the District of Chilliwack.

REVENUE

Water Licensing Fees and Rentals

	Year ended Mar. 31, 1984	Year ended Mar. 31, 1985	Year ended Mar. 31, 1986	Year ended Mar. 31, 1987	Year ended Mar. 31, 1988
Application Fees	$ 167,680	$ 127,090	$ 138,320	$ 113,752	$ 219,265
Power	172,739,369	193,623,612	220,183,055	228,195,721	222,476,346
Local Authority	543,899	539,039	570,117	633,794	671,228
Other Rental	1,116,420	1,144,313	1,269,289	1,129,390	1,460,396
Interest	1,241	143	-	-	-
TOTAL REVENUE	$ 174,568,609	$ 195,434,197	$ 222,160,781	$ 230,072,657	$ 225,827,235

Note: - Power revenue is that received from public utilities and other major operators. Small private developments are included under other rental.
- Local Authority revenue is that received from those agencies supplying water for waterworks or irrigation purposes to their residents. Revenue from private water utilities and individual irrigation users is included under other rental.
- Other rental includes charges noted above plus rentals assessed for industrial, mining, domestic, storage and other purposes and for permits to occupy Crown Land.

- Power rentals were subject to annual indexing until 1985.
- Interest charged on overdue accounts only on January 1, 1984.
- Revenue from Other Rental and Application Fees for year ending Mar. 31, 1988 reflects revised tariff approved July, 1987.

Number of active Water Licences:

As of March 31, 1984	35,960
" 1985	36,758
" 1986	37,487
" 1987	37,963
" 1988	38,162

Air Management Program

The goal of the Air Management Program is to maintain atmospheric quality in British Columbia at a level conducive to good health and a quality environment, and to provide atmospheric information necessary for the management of British Columbia's resources.

The objectives of the Air Management Program are:

1. To establish air quality standards and to monitor major airsheds in the province to ensure the standards are maintained.
2. To develop and implement airshed management systems to ensure air quality which is conducive to good health and to maintenance of the province's natural resources.
3. To provide atmospheric data and expert services to ministry programs and other agencies.
4. To regulate weather modification.

Legislation Administered

Environment Management Act
Weather Modification Act

Air Quality Standards and Monitoring

Air Program staff continue to review and provide input to federal air quality objectives. Documents for sulphur dioxide and carbon monoxide have now been published, while nitrogen dioxide, hydrogen fluoride, ozone and hydrogen sulphide reports will be published in the near future.

A report on the air quality of Castlegar has been published.

The ministry operated a total of 34 continuous ambient air monitors and 22 meteorological stations throughout the province while over 50 continuous monitors were operated by the Greater Vancouver Regional District (GVRD) and over 30 were operated by industry. Approximately 18,000 laboratory analysis of airborne pollutants were conducted from samples being collected at over 500 locations throughout the province. Ministry and industry continuous air monitors were routinely audited for quality control.

The special joint government/industry monitoring project in Prince George continues to address the high level of pollutants in the area. In Cranbrook, a program to monitor inhalable particulates (PM10) and polycyclic aromatic hydrocarbons (PAH) from residential woodsmoke is near completion. Monitoring programs are in place to determine levels of PM10 and PAH in Williams Lake from woodwaste burner smoke and in the Okanagan from slashburning smoke.

A government/industry committee has been set up to assess air quality impacts in the Howe Sound area and to establish an ambient air quality monitoring program. Meteorological stations were established in Prince George, Skookumchuk, Chilliwack and Langdale to assess the impact of meteorology in the transport of air pollutants. Acid rain monitoring continues with the emphasis on the Strait of Georgia; two high elevation precipitation chemistry and fog monitoring stations have been established by the Ministry in Mt. Seymour Park to study the effects of acid rain and fog on high elevation ecosystems.

Vegetation monitoring was conducted at a number of locations including Trail, Kimberly, Skookumchuk, Port Alice, Powell River and the Howe Sound area, to determine the impact on vegetation from air pollutants such as sulphur dioxide, hydrogen sulphide, mercury, lead and fluorides. Monitoring was conducted in the Vancouver area to determine any impact of the new incinerator in Burnaby. Program staff met with U.S. federal and state officials to discuss acid rain impacts on vegetation in the Pacific North West.

Development and enhancement of environmental data management systems continues. The Continuous Air Monitoring Information System (CAMIS) which archives historical and Greater Vancouver Regional District air quality data will soon also be able to incorporate industry data. The Meteorological Information System (MIS) which provides meteorological data archiving and reporting functions continues to operate and is now accessible to regional staff. The Automated Air Quality Retrieval System (AAQRS) is currently operational in Prince George, Port Alice, Trail and Castlegar and can automatically poll air quality stations and report to regions when certain exceedance levels occur. The System for Environmental Assessment and Management (SEAM) accepts data from non-continuous air quality monitoring and can now be accessed to

assess air quality episodes exceeding ministry air quality objectives.

Air Management Program staff have actively participated on several federal/provincial committees preparing an action plan for hazardous air pollutants; initiating the development of guidelines for dioxins in the environment; evaluating dioxin samplers; and conducting a test burn of hazardous waste materials at the Swan Hills, Alberta, hazardous waste incinerator.

Air Management Strategies

Management strategies continue to be identified in order to regulate critical air pollutants in priority airsheds and to address the concerns of air pollution excursions over objective levels. Air management control plans have been prepared or are being prepared for eleven locations in the province and are being considered at a further seven. As a part of these plans, real-time data systems are operating in Victoria, Prince George, Trail, Castlegar, Kamloops, Port Alice, Squamish and industry stations have been established at Langdale and Horseshoe Bay. As well, in some locations, industry can access the data allowing them to respond much quicker to control pollution episodes. Further, this system can automatically poll those stations with electronic data loggers, provide quality control for the data and report exceedances of air quality objectives.

The ozone control strategy for the Lower Mainland was strengthened with the raising of the tax on leaded fuel in April, 1987, as a disincentive for misfueling and by the introduction of new federal standards for automobile emissions in September 1987. Preliminary modelling indicates a reduction of 25–45 per cent in hydrocarbon emissions is required to meet national air quality guidelines. A task force has investigated vehicle inspection and maintenance programs as a means of reducing emissions and have drafted a report on hydrocarbon emissions from gasoline marketing. A detailed inventory of all sources of air pollutants in the Greater Vancouver Regional District was completed. Staff participated in meetings with other government and industry groups on the use of alternative fuels, mainly alcohol blends and natural gas, in motor vehicles. An investigation, in cooperation with Environment Canada, is being conducted to assess the potential impact on vehicle emissions, by using alternate fuels. A system has been established whereby Ministry of Health authorities are alerted when ozone in the Fraser Valley reaches levels which may impact on public health.

A committee of deputy ministers from the western provinces is pursuing an acid rain control strategy for Western Canada. Provincial maps of sensitive environments to acidic deposition have been completed. A recent ministry document indicates 76 per cent of the land area of British Columbia is moderately or highly sensitive to acid rain and much of the highly sensitive land is in the coastal area of the province. Current monitoring indicates these coastal areas have acid deposition levels that may be of concern.

In Prince George, high ambient levels of total reduced sulphur continue with 1987 being one of the worst on record. A joint government/industry committee has assessed sources of total reduced sulphur emissions and their impact on air quality in Prince George and it has been determined that emissions from effluent ponds are the largest source. As a result of this study the local pulp mills and the oil refinery will upgrade their facilities using the very latest technology to reduce air pollution emissions. This will result in a steady improvement in Prince George air quality.

Other areas of the province which have levels of air pollutants that may be of concern include Castlegar, Trail, Kimberly, Skookumchuk, Prince Rupert, Kamloops, Port Alice and Port Alberni. These and other areas are being monitored and control strategies developed as necessary.

Many of the pulp mills have committed significant amounts of monies to upgrade pollution control works. Modifications at some mills such as at Castlegar, have resulted in improved air quality.

Smoke from woodwaste burners, residential woodsmoke, and slashburning continues to be of major concern. In Williams Lake, smoke and flyash from woodwaste burners are subject to an extensive monitoring program to try to identify any health impacts. The ministry has prepared a report which discusses both short and long term control strategies and recently, industry has been ordered by the Ministry to upgrade existing burners by the end of 1988. Woodwaste burner problems in Merritt resulted in a report being presented to city council on possible solutions and a joint ministry/city/industry committee being set up. A two year study is near conclusion in Cranbrook to monitor residential woodsmoke to try to determine if these pollutants have a health impact as well as being a nuisance. A final report on the results from the study are expected in the near future.

In the Okanagan, a joint Forest Service/ Environment air quality slash burning monitoring project was conducted and will continue in 1988. Discussions with the Ministry of Forest and Lands have resulted in recommended improvements to smoke management practices in the province.

The Air Management Program continued to enhance its capability to model air pollutant dispersion by further developing meteorological data handling and preprocessing systems; by installing and modifying the COMPLEX 1 and Industrial Source Complex dispersion models; and by acquiring and installing the Rough Terrain Diffusion model. Other recently developed dispersion models continue to be assessed for application within British Columbia.

An in-house emission inventory management system for all permitted sources, except the Greater Vancouver Regional District, is now in use. (The GVRD maintains a separate emissions data base for that district). Emission data for 1985 is complete and reports on various pollutants in preparation. The emission inventory data base will be updated in subsequent years. A similar data base for emissions from hospital incinerators was also prepared. It is anticipated that an emission inventory data base system for area and mobile sources will be developed in the next fiscal year. Staff continue to be involved with federal/ provincial/GVRD working groups to coordinate emission inventory management systems and by the sharing of data.

Atmospheric Data and Expert Services

The Environmental Laboratory continued to supply training for stack sampling, smoke opacity monitoring and ambient air sampling, enhancing the ministry's enforcement capabilities for air emissions. In addition, a program of emissions measurement of various industry sources continues, as well as the routine performance auditing and witnessing of industrial emission sampling.

The development of interim emission guidelines for municipal incinerators in the province continues, as well as the development of national emission guidelines and operational requirements. Staff also participated in the preparation of an inventory of major sources of sulphurous emissions on Vancouver Island and other coastal regions, and were involved in a federal/provincial working group to prepare a report on the emissions from oil and natural gas fields in northern B.C.

Computerized data files containing all air quality and climatological data for the province were maintained. Environment Canada is reviewing a proposal to transfer the B.C. climate data file to the national archive.

The operations of 61 meteorological stations were coordinated by the program, collecting data on temperature, precipitation, wind and solar radiation.

Major applications for permits or permit amendments and a number of environmental reports on proposed development projects were reviewed. Atmospheric modelling and meteorological requirements for specific industrial air quality issues were prepared.

Staff responded to 211 requests for climatological data or services and also provided a number of agrometeorological services to government agencies and the public. A joint publication with the Ministry of Agriculture and Fisheries entitled "British Columbia Frost Protection Guide" is being prepared. Frost risk maps for the Creston area were published. Climate Capability maps for the Peace River area were completed, resulting in the publication of updated Agricultural Capability maps for the area.

Weather Modification

No applications under the Weather Modification Act were received.

Waste Management Program

The goal of the Waste Management Program is to protect the environment of British Columbia by controlling the impact of polluting substances.

The objectives are:

1. To develop discharge and emission standards and, in conjunction with the Air and Water Management Programs, to develop environmental quality objectives, develop management strategies to ensure long-term attainment of the objectives and monitor the environment to ensure the objectives are maintained.
2. To minimize the introduction of hazardous substances into the environment.
3. To provide adequate protection of the environment by managing discharges to air, land, and water.

Legislation Administered

Waste Management Act
Environment Management Act
Litter Act and Regulations
Waste Management Regulation
Waste Management Permit Fees Regulation
Special Waste Regulation

General

In recognition of the rapid changes taking place in the industrial and economic complexion of the province, advances in the identification and measurement of contaminants and progressively more demanding requirements for environmental protection, a number of initiatives have been undertaken under the Waste Management Program to adjust program activities to changing conditions and to tighten regulatory and other controls.

Amendments were introduced to the Waste Management Act to broaden and strengthen controls under Special Waste Regulations which were introduced later in the year to take effect on April 1, 1988. The amendments also provide for a Waste Management Trust Fund to finance clean-up and long-term care of special waste storage and disposal facilities. Special wastes may be described as those substances which in themselves are safety or environmental hazards or may become so through improper handling or disposal. The regulations provide for the registration of generators, siting and safety standards for storage and disposal facilities, the licensing of transporters, and the tracking of shipments through a manifest system. Synopses of these initiatives together with those of other activities undertaken in support of the program goal and objectives are presented in the following sections.

The Waste Management Permit Fees Regulation took effect on September 1, 1987, and provided for the payment of an annual fee based on production capacity in respect of permits issued for the disposal of wastes under the Waste Management Act. Initially the scale of fees applied principally to the industrial and commercial sector of the provincial eocnomy. However, under amendments effective April 1, 1988, municipal permits for liquid waste treatment plants and incinerators are also included in the fee structure. Municipal refuse permits are exempt.

At year's end, the fee schedule applied to some 87 per cent of the 3451 Permits of record and anticipated new revenue was estimated at $4.2 million. In addition, the fee schedule applies to all new applications for permits, which number about two hundred annually.

Discharge and Emission Standards

The ministry's mandate to exercise controls over solid and liquid waste discharges and air emissions dates from the Pollution Control Act of 1967. By the mid-1970s, following public inquiries, a series of five pollution control objectives documents were issued to guide the Director and producers of the various industrial and municipal type wastes as to treatment and disposal considerations required to preclude or minimize environmental degradation at the point of disposal.

In the years since the objectives documents were issued, technology, both producing and identifying wastes, has advanced and environmental protection perceptions have changed. Accordingly, the ministry decided that an independent criticial review of all the Objectives documents should be conducted. During the current year, a consultant was retained to review the pollution control objectives for the chemical and petroleum industries. The draft report, with recommended

changes, will be released for public comment in the autumn of 1988. It is planned to similarly review the objectives documents for the forest products, mining and smelting, food products, agriculturally oriented and miscellaneous industries, and for municipal type waste discharges over the next several years.

Water Quality Objectives

In conjunction with the Water Management Branch, water quality criteria documentation was prepared in the current year for copper, lead, aluminum and microbiological indicators. These supplement reports prepared in previous years for nitrogen, molybdenum, cyanides, particulate materials and nutrients and algae and the criteria are generally applicable to all British Columbia waterways.

The program also contributed towards development of Water Quality Objectives reports for the Peace River, Williams Lake, and Boundary Bay, bringing the total number of available reports in this subject area to 21.

Waste Management personnel continued to carry out environmental surveillance monitoring activities in the immediate vicinity of all discharges. As an added check on the long-term impact of watershed activities, data is collected quarterly at 21 federal, 52 provincial, and 21 jointly-funded sites under the federal/provincial Water Quality Agreement. Data is stored for retrieval on the provincial SEAM and federal ORACLE data banks.

Environmental Safety

The special waste regulation which was released in draft form for public comment in early 1987 was approved by the Lieutenant-Governor in Council and became effective on April 1, 1988. The new regulation requires the compulsory submission of special waste shipping manifests commencing on the effective date and the registration of generators and licensing of haulers after July 1, 1988. The regulations define special wastes and describe testing procedures and include siting, construction and other requirements relating to the storage, transport and disposal of special wastes. Persons operating storage and disposal facilities are also subject to the permit provisions of the Waste Management Act.

The Special Waste Advisory Committee, under the chairmanship of Dr. David Boyes, endorsed the proposal of British Columbia Special Waste Services Inc. for a treatment and disposal facility to manage the estimated 70,000 tonnes of special wastes produced annually in British Columbia. A site is expected to be selected in the vicinity of Ashcroft/Cache Creek.

The ministry continues to operate eight special waste reception and storage facilities at various locations throughout the province for the convenience of householders and other minor generators. During the year, a total of 167 barrels of special waste were shipped to the Syntath facility in Ontario and one barrel was shipped to the University of British Columbia for destruction through incineration. The disposal costs last year were $80,000 compared to $125,000 in the previous year.

Industry and business are asked to address the matter of prevention and remediation of spills by the preparation of appropriate contingency plans. During the last year, a total of 306 plans were in progress and 107 were either complete or nearly so. This compares to 163 in progress and 24 completed last year. There were 727 spill reports received last year, requiring on-site staff attendance on 126 occasions. The relative number of incidents and responses has remained constant over the last several years.

Management of Discharges

Waste Management Program Staff continued to encourage municipalities to develop waste management plans where professional advice is retained to study options for waste disposal on a regional basis. Interested environmental groups are invited to participate in the plan development and area residents have an opportunity to comment. The final options selected are summarized in report form and recommendations are presented to the minister for consideration and approval.

The Nanaimo Regional District is developing a solid waste management plan involving recovery of ferrous metals, production of refuse derived fuel, and composting of biodegradables using Swedish technology and landfilling of the remainder. Through its solid waste plan the Greater Vancouver Regional District is also establishing mechanisms that will result in significant recovery of solid waste materials for utilization.

Under the umbrella of the Okanagan Water Quality Project, liquid waste management plans involving nutrient management elements have been approved for Vernon, Penticton, Westbank, Armstrong, and Osoyoos and plans for Summerland and the Regional District of Okanagan-Similkameen are in preparation. Investigations are underway to identify and

develop controls for those areas where improper agriculture, forestry or sewage disposal practices would contribute to the migration of nutrients to the lakes system.

The use of chlorophenates and other anti-sapstain chemicals for lumber treatment continued to be a major concern, since research has shown that surface residuals washed into watercourses from yard stored lumber, even in minor quantities, are toxic to aquatic organisms. A task force consisting of industry and federal and provincial government representatives, prepared a report indicating allowable levels of chemical residuals that could be tolerated in stormwater runoff and a recommended time schedule for compliance. Included in the report was a section prepared by industry on available mitigative technologies together with associated costs. Final selections and phase-in considerations are yet to be determined.

Variance Orders

The Waste Management Act contains a provision for the minister to grant temporary relief from the requirements of a permit, approval, waste management plan or an order or license granted under the Act where he considers that a request is justified.

The Cominco Smelter at Trail is operating under a variance order for sulphur dioxide emissions pending completion of new lead refinery facilities. Plant production is presently adjusted in accordance with ambient air quality measurements to ensure that healthful conditions are maintained.

The Western Pulp mill at Woodfibre operated under variance orders with respect to the toxicity limit on the mill effluent and suspended particulate and total reduced sulphur from a recovery boiler stack. The plant modernization program covered by the variance order was completed by the January 31, 1988 expiry date.

The Canadian Forest Products mill at Port Mellon operated under a variance order for suspended particulate emissions from the Number 3 recovery boiler. The variance order was replaced with an amended permit to authorize a mill reconstruction period which requires Level "B" emission standards from the Number 13 power boiler and Level "A" for the rest of the plant by August 1, 1991.

British Columbia Forest Products was granted a variance order in respect of its sawmill at Boston Bar. This allowed continued use of an obsolete woodwaste burner pending replacement with a new unit which is now installed and operating.

The jointly-owned Power Consolidated (China) Pulp Inc.—Consolidated Bathhurst Ltd. mill at Castlegar was granted variance orders in respect of total reduced sulphur and suspended particulate air emissions and for liquid waste discharges. The variance order for emissions authorizes staged improvements for total reduced sulphur to be completed by the end of 1988, and suspended particulate by June 30, 1991. The variance order for the mill effluent requires the mill to meet Level "B" quality standards by July 11, 1996.

The MacMillan Bloedel Ltd. mill at Harmac is operating under an air emission variance order for total reduced sulphur and suspended particulate. The Variance Order expires on August 31, 1988. A Variance Order was similarly issued for the company's mill at Port Alberni which expires on September 30, 1988. Permit amendment applications are under consideration for the necessary scheduled emissions improvements at both locations.

Pesticide Control Program

The Pesticide Control Program is responsible for ensuring that useful, federally-approved pesticides are sold and used safely in the province in a manner that will not produce an unreasonable adverse effect on people or the environment.

The program includes eight major activities:

1. Administering the Pesticide Control Act.
2. Establishing conditions for, and issuing permits for, various types of pesticide uses.
3. Providing study kits and offering adult extension courses on the safe use of pesticides.
4. Setting exams for, and issuing certificates to, individual pesticide applicators and dispensers who have a basic knowledge about pesticides.
5. Establishing standards for, and issuing licences to, pesticide vendors and pest control service agencies.
6. Conducting inspections and investigations of pesticide accidents and misuse.
7. Supplying the public with technical information on pesticides.
8. Conducting monitoring surveys into pesticide sale and use and into environmental contamination.

Statistics on these activities are summarized in the table following this section.

Legislation

Several small amendments were made to the Pesticide Control Act Regulation. These included the requirement for a certified applicator to supervise no more than four uncertified assistants. The classification of several pesticides was also revised so that use would require a permit and/or applicator certification.

Permits

Pesticide use is regulated partly through the permit system. Pesticide Use Permits are required for pesticides applied to publicly-owned land, water bodies, or land that is used for forestry, transportation or public utility purposes. Special Use Permits are granted for research trials involving unregistered pesticides. Restricted Permits are granted for highly toxic or highly persistent compounds listed as Schedule I in the Regulation.

There were 641 applications for Pesticide Use Permits in 1987, a 22 percent increase over 1986. In addition, there were 60 applications for Special Use Permits and 28 applications for Restricted Permits in 1987.

Assistance in reviewing Pesticide Use Permits is obtained from regional program managers and members of the Pesticide Control Committee, which is represented by members from the Ministries of Forests, Environment, Agriculture and Fisheries, Health, and Environment Canada. All permits are issued from headquarters through the Permit Coordinator.

Anyone who disputes the issuing of a Pesticide Use Permit can appeal to the Environmental Appeal Board. During the past year, there were appeal hearings on 33 permits. The Environmental Appeal Board added or amended conditions (or extended the completion date, due to delays caused by the appeal process) to 14 permits. One permit was cancelled.

Training and Certification

Training, evaluation and certification of pesticide applicators and dispensers are important activities for the program. They ensure that those people who handle and sell pesticides acquire knowledge of pesticide technology. The certification procedures are coordinated from headquarters. Candidates' examinations are marked, and certificates are issued, by staff in regional offices at Nanaimo, Surrey, Penticton and Prince George. Training courses are delivered by Regional Pesticide Control staff as well as by colleges and private instructors.

In 1987, regional staff participated in 101 adult pesticide training courses. A total of 4,487 certification exams were written and 3,428 certificates were issued during the past fiscal year (up 14 per cent over 1986). Of the certificates issued, 2,175 were issued to qualified applicators and 1,253 were issued to qualified dispensers.

A pilot project was begun in the Okanagan to turn over the administration of certification training courses to the local college. Staff vacancies on Vancouver Island reduced regional staff involvement in certification

training courses, but again, colleges helped provide training.

The task of updating and revising the Handbook for Pesticide Applicators and Dispensers was completed. This text provides core information for applicator and dispenser training. A new Forestry Supplement to the Handbook was also completed for use in the forestry applicator certification study kit.

Liaison with pesticide applicator trainers in other provinces was initiated in order to develop national standards for applicator training and certification.

Licences

The four regional offices issued a total of 1,768 licences in 1987 (809 Pesticide Vendor Licences and 959 Pest Control Service Licences).

A new computer system was developed for regional issuance of licences and certificates, with a central data bank in Victoria. Computer terminals and printers were purchased for three regional offices. Computer generation of licences and certificates will reduce the staff time required to issue these forms. It is now possible to quickly check that a company has certified staff, before they are issued a Vendor or Service Licence. In addition, it will be possible to generate mailing lists of licenced pesticide vendors or service companies. Such lists will be used to issue correspondence dealing with pesticide use restrictions or changes to regulations.

Compliance

Regional staff are involved in enforcing all aspects of the Pesticide Control Act and Regulations. An inspector may examine a vendor's storage facility or ensure all permit conditions are observed during a pesticide application.

In 1987, a major project of inspecting forest application sites was let to contract. The objective was to obtain on-site data to speed up the review of permit applications and to ensure that permit conditions and other pesticide use regulations were complied with. The contractor inspected treatment sites for 359 out of 475 forestry-related Pesticide Use Permits. Contract inspectors reported on any observed unsafe pesticide use practices and these were investigated by Pesticide Control Program staff. There were additional inspections of mostly non-forestry permit sites by regional staff. Also during 1987, regional Pesticide Control Program staff inspected 1,508 pesticide service and vendor sites. This year special emphasis was placed on inspections of pesticide storage facilities in vehicles used by landscape workers on the Lower Mainland.

As as result of service, vendor and permit inspections, 21 licences were suspended or revoked, two permits were suspended and 26 charges were laid. A total of $3,050 was levied in fines. Numerous warnings were issued for minor infractions.

Investigations

Staff investigated 182 reports of pesticide misuse or environmental contamination by pesticides. These incidents included: alleged poisonings of humans or domestic animals, spray drift damage to vegetation, fires involving pesticides, bird or wildlife poisonings and pesticide spills.

Examples of these investigations included two incidents of a child finding the concealed location, and ingesting rodenticide bait. A worker suffered symptoms of pesticide poisoning as a result of entering a fumigated greenhouse before it was properly aerated. A number of pigeons were poisoned from eating diazinon granules applied to an agricultural crop. Several incidents of pigeon deaths from use of the bird repellent Avitrol were investigated. A spill of insecticide on a highway resulted in the operator being charged with a fine and the cost of cleanup. A fire involving methyl parathion in a pesticide manufacturing facility on the Lower Mainland was investigated. A study was initiated in the Lower Mainland to examine the potential for wood chips used in agriculture to be contaminated with chlorophenols.

Pesticide Monitoring

Fixed sites on relatively large rivers and lakes in areas of agricultural pesticide use were selected for ongoing monitoring of ambient levels of pesticides. Samples will be taken two or three times per year and analysed for three major pesticide groups: organophosphates, organochlorines and acid-extractable herbicides. In 1987 all 23 sites sampled showed no detectable pesticide residues.

A total of 30 domestic well water samples were taken from the Langley-Abbotsford area, which has intensive agricultural pesticide use associated with aquifers at risk of contamination. Samples were analysed for three major pesticide groups: organophosphates,

organochlorines and acid-extractable herbicides. The results showed 24 samples with no detectable residues, five with dinoseb traces and one with diazinon traces.

Technical Information and Publicity

The Branch continues to supply the public with advice on the safe use of pesticides. The program handled many inquiries about pest control and concerns about pesticide safety. The brochure, "Safe Pesticide Use Around the Home and Garden" was distributed, on request, to the public, schools and garden shops. Program staff are requested by other agencies to be guest lecturers at colleges, forestry pest control committees, agricultural pest control committees, and community horticultural meetings. Regional managers appeared on several radio talk shows to answer questions and to discuss safe handling and prudent use of pesticides to protect people and the environment.

SUMMARY OF PESTICIDE CONTROL PROGRAM ACTIVITIES BY REGIONS
1987/88 FISCAL YEAR

	Region 1	Region 2	Regions 3 & 4	Region 5	GRAND TOTAL
LICENCING:					
Vendor Licences Issued	93	401	219	96	809
Service Licences Issued	94	510	197	158	959
PERMITS:					
Pesticide Use Applications	95	97	206	243	641
Special Use Applications	11	17	18	14	60
Restricted Applications	5	19	4	-	28
TRAINING & CERTIFICATION:					
Pesticide Applicator and Dispenser Courses	9	54	15	23	101
Course Attendance	160	794	473	419	1846
Study Kits Issued	929	1964	1125	582	4600
Examinations Written (Courses and Home Study)	880	1767	1171	669	4487
Certificates Issued	714	1477	794	443	3428
Failures	166	299	347	226	1038
COMPLIANCE:					
Vendor and Applicator Inspections	45	1175	54	234	1508
Permit Inspections	55	158	240	151	604
Licences Suspended/Revoked	-	-	-	21	21
Permits Suspended/Revoked	-	-	-	2	2
Charges Laid	1	20	3	2	26
INVESTIGATIONS:					
Pesticide Accident/Misuse Investigations	15	117	38	12	182

Notes:

- Data is presented for the four Ministry regional offices which handle Pesticide Control Program functions:

  Region 1 - Vancouver Island and Queen Charlottes
  Region 2 - Lower Mainland
  Regions 3 and 4 - Cariboo, Okanagan and Kootenays
  Region 5 - Northern British Columbia

- Permit inspections include inspections by contract inspectors.

Surveys and Resource Mapping Program

The goal of the Surveys and Resource Mapping Program is to provide base mapping, biophysical resource mapping and survey control to meet the economic and resource management needs of government agencies and the public.

The program is organized into five sections, each designed to address specific aspects of the program objectives.

Program, Contracts and Development Section

This section is responsible for providing program management support to the director; project planning, coordination and control; contract management, and technical support and development.

The Program Management Information System (PMIS), developed in phases over the last three years, provides a framework for monitoring the progress and costs of projects through to completion and delivery. The final phase, to incorporate graphics and archival files for completed projects, is expected to be implemented next fiscal year.

The Terrain Resource Information Management (TRIM) project, to provide feature coded planimetry and elevation data in digital format, has attained operational status; a full production control process, including scheduling, monitoring, inspection and acceptance has been established, and quality control has been facilitated with the addition of an independent system (CARIS) to check submitted data files for completeness, continuity and integrity. The program has generated tremendous interest throughout the province; to date, some 3,500 individual requests for more than 2,700 separate TRIM files have been received.

In support of data acquisition for TRIM, approximately 60 per cent of the province has been covered with a consistent and coherent geodetic control network, and recent aerial photography has been acquired over approximately 80 per cent of the province.

The University of Calgary was awarded a contract to develop a geoid model for British Columbia for the purpose of enabling the determination of elevations above sea level by means of precise satellite positioning using the Global Positioning System (GPS).

Investigations are continuing into applications of various geographically referenced data to resource management issues including soil capability studies, land use planning, land cover inventory and hydrological modelling. In addition, municipal map data requirements are being studied prior to the development of specifications and guidelines for large scale digital mapping in support of municipal land related information system applications. Research is also being conducted into satellite image analysis technology to assess its feasibility and utility to the preparation of base line thematic maps.

Surveys and Cadastre Section

Responsible for field survey operations, control survey computations, cadastral map compilation and equipment fabrication and maintenance.

The branch is the provincial agency responsible for the management of the North American Datum 1983 (NAD83) redefinition and readjustment in British Columbia. Plans for the orderly implementation of NAD83 are being made in cooperation with other government agencies including the Surveyor General Branch, the Petroleum Engineering and Operations Branch, and the Geodetic Survey of Canada. The branch continued data preparation and preliminary computations for approximately 14,000 control stations. A simultaneous adjustment of all primary and secondary networks in Canada on the new datum is planned to take place in 1989. Coordinates for the remaining 75,000 stations in our records will be computed over the next several years. In addition, records of cadastral tie points have been compiled on a computer in an attempt to make the support of cadastral compilation more efficient.

As part of an educational program, papers on NAD83 and on the Global Positioning System (GPS) were presented at the 5th Annual Northwest Conference on Surveying and Mapping at Whistler in June 1987, and at the 12th Land Resource Science Workshop at UBC

in February, 1988. A paper was prepared for distribution and presentation at the Canadian Institute of Surveying and Mapping Workshops on NAD83, to be held across Canada during 1988 and 1989.

A total of 1,770 monuments were surveyed in the Esquimalt, Saanich, Victoria, Nanaimo, Vancouver, and Delta areas, and 632 points were marked in preparation for integrated control surveys in White Rock, Tsawassen, Burnaby, Colwood, City of North Vancouver, Ladysmith and Annacis Island. After March 31, 1988, all field survey work will be done by the private sector.

In the area of cadastral compilation for large and intermediate scale mapping, training for operational management of digital coordinate geometry (COGO) was completed for existing staff. The need for additional hardware and software, identified last year, was partially met by the installation of four stand-alone Graphic Workstations in February, 1988. Delivery of an additional five Graphic Workstations is expected during fiscal 88/89.

Digital cadastral data were compiled for 291 — 1:2 000, 1:2 500, 1:5 000, 1:10 000, and 1:20 000 sheets. Digital compilation was also started in the southeast corner of British Columbia, in anticipation of the arrival of TRIM data for this area in fiscal 88/89.

Six mosaics were constructed for the Ministry of Forests and Lands as tactical aids to their fire suppression strategy.

Mapping and Data Systems Section

This section is responsible for the compilation and production of topographic and biophysical maps, including the development, application and management of related digital data bases, and coordination of all other computer operations supporting program production.

Biophysical mapping in digital and hard copy modes continued to focus on environmental themes such as soils, vegetation, forests, physiography, water, wildlife, and climate; a total of 436 such maps were produced. In addition, graphics services were supplied to 53 projects, including the Skagit Valley Wildlife Management Plan in support of International Hydro and Power agreements, and colour digital analysis maps in support of the Western and Northern Canada Long Range Transportation of Atmospheric Pollutants (acid rain) Program.

As part of this Branch's support to the Water Management Branch, 67 floodplain map bases were produced. In February, a five-year federal/provincial cost-sharing agreement was signed whereby this branch will produce 309 bases for 53 floodplain areas.

The Photogrammetric and Digital Mapping Units completed 84 topographic and 198 planimetric layers at scales of 1:2 000, 1:2 500 or 1:5 000, and 12 layers at 1:10 000 or 1:20 000. In combination with 193 cadastral layers, a total of 391 base maps were produced. A further 53 topographic and 76 planimetric layers are nearing completion.

Soils Survey Section

This section is responsible for collecting, classifying and analyzing soils and terrain data to provide information on soil properties and conditions as they relate to land use and its effects.

The Soils Section produced 224 soils and related interpretive maps in support of provincial resource agency land management programs. Included are agriculture capability maps of the Okanagan and Similkameen valleys for the Agricultural Land Commission and the B.C. Assessment Authority, soil erosion maps for the Okanagan Water Quality Program, and soil survey maps for an urban planning study in the Highlands area of Victoria.

Detailed soils reports were published for the Jarvis Creek-Morkill River and Bonaparte River-Canim Lake areas; work on Port Alberni, Prince George, Ashcroft, and East Kootenay reports is continuing. The section is also continuing work on biophysical manuals that will address mapping standards and field procedures.

Soils specialist advice was provided to provincial and federal agencies, resource companies and the public, on soil properties and their application to proper land use management throughout the province. Of interest to the generalist is a small-scale soils map of the entire province that is being compiled and will be published in cooperation with Agriculture Canada.

Administration and Reprographic Services Section

This section is responsible for providing administration and secretarial support to the program, including the distribution of reports

and the reproduction and distribution of mapping and aerial photography.

MAPS-B.C. continued to pursue the privatization of retail map and photo sales; 70 per cent of all products sold to the public were distributed at wholesale prices to an expanded network of retail outlets throughout British Columbia, western Canada and the western United States. Net revenue from sales of all products to the public was $530,187, a 12 per cent decrease from 86/87, reflecting the additional discounts offered to retail outlets. At the end of March 1988 an agreement was in place to amalgamate the map distribution function of the Ministry of Energy, Mines and Petroleum Resources with MAPS-B.C.

PRODUCTS DISTRIBUTED THROUGH MAPS-B.C.

	Total # Distributed
Lithographed Maps (Including Thematic Maps and Aeronautical Charts)	176,605
Biophysical Reports	1,973
Aerial Photographs, Enlargements and Diapositives	377,696
Whiteprints and Photographic Prints	200,599
	756,873

* Products are distributed at cost to government ministries, and at varying discounts to retail outlets.

Administration and Technical Services

Financial Services Branch

Financial Services Branch provides accounting services for the ministry, including preparation of annual estimates, budgetary control, preparation and distribution of payroll data, processing of accounts payable, billing and collection of revenue, promulgation of financial policy and procedures, and the preparation of financial reports and summaries to meet internal and external requirements.

A new Master Agreement between the Province and the British Columbia Government Employees' Union was signed in September 1986. One of the changes in the new agreement called for payout of employee wages in a shorter time frame than previously applied. For hourly-paid auxiliary employees, the previous manual systems used for collection of payroll data in the field were inadequate. Accordingly, a computerized system was designed and implemented to meet this need.

Throughout the fiscal year, Financial Services was involved with the ongoing consolidation of Parks and Outdoor Recreation Division into the Ministry of Environment and Parks.

The ministry's Asset Control System is made up of three systems: the Operations Inventory System, the Warehouse Inventory System and the Data Processing Inventory System. The introduction of the Operations Inventory System has been completed for all Environment branches, regional and sub-regional offices, except the Environmental Laboratory. An extensive system training program was completed and in addition, a comprehensive user manual was introduced. The system was introduced to the Malahat District and Victoria Headquarters of the Parks and Outdoor Recreation Division as a pilot project. It is anticipated the remaining region and district offices will be introduced to the system in late 1988 or early 1989.

Implementation of the ministry's Project Budgeting System was completed during the year after extensive training and development of a comprehensive manual. In tandem with this effort was the development of a Financial Forecast System that will allow ministry executive and staff to effectively monitor the ministry's financial position and make informed decisions to reflect changing priorities.

Fee increases were implemented by several programs following a "Report on the Revenue Administration Review of the Ministry". Policy and procedures were developed which enabled a new fee structure to be implemented for Waste Management Permits.

The Statement of Revenue and Recoveries and the Statement of Expenditures by Appropriation for the fiscal year ended March 31, 1988 contained in this annual report have been prepared by management in accordance with the accounting policies adopted by the Province of British Columbia. These statements are incorporated in the combined financial statements of the Province, which are examined by the Auditor General. However, at this time the audit examination leading to the expression of an opinion on the combined financial statements is not yet complete.

MINISTRY OF ENVIRONMENT AND PARKS

STATEMENT OF REVENUE AND RECOVERIES

FOR THE FISCAL YEAR ENDED MARCH 31, 1988

REVENUE		
Water Act:		
Power		$212,845,029
Waterworks and Irrigation		648,200
Domestic, incidental use and fees		1,477,511
		$214,970,740
Wildlife Act fees and licences		10,255,019
Sale of maps and air photos		530,187
Pesticide exams and study kits		17,275
Pesticide licences		44,915
Campsite permits		4,107,761
Park use permits		238,857
Environmental Laboratory - water test kits		30,325
Waste Management permit fees		2,143,380
Miscellaneous		155,886
TOTAL REVENUE		$232,494,345
RECOVERIES		
Federal Government:		
Canada-British Columbia Joint Development Act	$ 2,652,045	
Pacific Rim Park	17,000,000	$ 19,652,045
B.C. Hydro and Other:		
Canada-British Columbia Hydrometric Agreement	$ 207,667	
Recreational Fisheries	298,805	
Wildlife	185,625	
Parks	113,131	
Environmental Laboratory	212,282	
Air Management	83,517	
Surveys & Resource Mapping	24,514	
Water Management	21,113	
Waste Management	5,986	1,152,640
Products for Re-Sale:		
Surveys & Resource Mapping	$ 204,589	
Pesticide Control	98,681	303,270
TOTAL RECOVERIES		$ 21,107,955
SPECIAL PURPOSE FUNDS		
Habitat Conservation Fund		
Fees	$ 1,453,621	
Other	94,730	$ 1,548,351
Arrow Lake Trust Fund		
Interest		229,655
TOTAL SPECIAL PURPOSE REVENUE		$ 1,778,006
TOTAL REVENUE AND RECOVERIES		$255,380,306

MINISTRY OF ENVIRONMENT AND PARKS

STATEMENT OF EXPENDITURES BY APPROPRIATION

FOR THE FISCAL YEAR ENDED MARCH 31, 1988

Vote No.	Description	Appropriations	Actual Expenditures
29	Minister's Office	$ 224,378	$ 223,346
30	Resource and Environmental Management	135,466,990	131,176,195
	Statutory -		
	Financial Administration Act		
Sec. 22	Kokanee Creek Park	937	937
Sec. 22	B.C. Forest Products	43,940	43,940
Sec. 22	Princess Louisa	2,996	2,996
Sec. 22	Department of Fisheries and Oceans	14,053	14,053
Sec. 22	Canadian Occidental	5,000	5,000
Sec. 22	Later Chemical Spill	23,788	23,788
	Special Fund - Wildlife Act - Habitat Conservation Fund	1,829,373	1,488,090
		$ 137,611,455	$132,978,345

Personnel Services

Personnel Services provides a wide range of human resource management services to the ministry, including recruitment and selection, salary administration, job classification, contract administration, collective bargaining, employee relations, staff development, safety and records administration.

A highlight during the year was the implementation of a leave management module on the computerized personnel system. This included both a development stage and the training of approximately 77 leave recording clerks throughout the province. The system became operational with only a few minor hitches and has been well received by the users. Major problems, however, were encountered in implementing the basic computerized personnel system. Computerization of safety and training systems was well into the development stage by year end.

Classification activity reached a peak in 1987, mainly due to the job evaluation and classification of all ministry Conservation Officers, Technicians and Engineering Technicians under the new Scientific/Technical Series which took place during the year. A review of all Enforcement Conservation Officers was also conducted, resulting in the creation of a new Technical Enforcement Series.

The Early Retirement Incentive Plan created a significant strain on staff resources during the latter months of the fiscal year. Staff processed the retirement of 112 employees under this plan.

A pilot program to enhance career development opportunities for Conservation Officers by encouraging lateral transfers to broaden their experience was initiated in 1987. The results were well received.

Recruiting activity was normal during the fiscal year. The annual competition for junior level Conservation Officers attracted approximately 160 applicants, of whom 12 were eventually selected for placement.

The following highlights some of the projects and services provided to the Ministry by the Staff Development and Safety Section during the last fiscal year.

1. A special one time fund of $10,000 was made available to assist the regional and branch Managers of Administration in meeting the job and career related training needs of Administrative staff.
2. A new Application for Staff Development System was developed to incorporate several improvements.
3. Two major Safety Audits provided information detailing the strengths and weaknesses of eleven essential elements of the safety program of the Vancouver Island Region and Parks Division.
4. A new three day Introduction to Supervision course was developed and delivered to 150 supervisors in Regions/ Branches. This course has been adopted by at least one major community college as a "standard" course for government supervisory personnel.
5. Operations involving the use of Ministry underwater divers received a special Refresher Course for Dive Site Supervisors. New Dive Supervisors were also trained and certified. A draft diving policy and procedure was developed in conjunction with Ministry Dive Supervisors and the Workers' Compensation Board.
6. A draft policy/procedure has been developed for all terrain vehicles/cycle policy and training. Training/certification standards and delivery methods to regions/ branches is under development with the B.C. Safety Council and the private sector. Delivery will be available in 1988/89.
7. Work on the Human Resource Management Information System (HRMIS) proceeded, and includes a component on accidents and near-miss accidents. The system is scheduled to be piloted in one region in November 1988.

Other policies and procedures were developed in the areas of Accident Reports, Electrofishing, Chemical Immobilization of Wildlife.

The Staff Development and Safety Section conducted/coordinated training programs in the following areas: Negotiation Skills, Safety Committee Operation, Safety Management for Supervisors, Taking Charge of Your Career, Presentation/Instructional Skills, Financial Management and Control, Contract Management, Chemical Immobilization of Wildlife, Wilderness Survival, Stress Management, Interpersonal Communication Skills.

The section conducted a five-day open house for Victoria employees, to acquaint employees with the areas of basic Management and Supervisory Skills, Communication, Safety, Career Development, and Stress Management. The section also provided written safety guides to managers and supervisors by developing and distributing to regions and branches "Checking the Skill Levels of Employees" and "Legal Liabilities for Volunteers and Contracted Workers".

Central Services Branch

The mission of Central Services is to provide accommodation through the B.C. Buildings Corporation; to administer the Vehicle Fleet; to provide telecommunications services; administer insurance requirements; to distribute policies and procedures, and to provide guidance and leadership in Records Management.

Central Services accomplished the following during 1987/88:

1. Accommodation for 1,872 employees;
2. Administered 646 vehicles and 2,200 pieces of licenced and unlicenced equipment;
3. Dealt with 494 requests for telephone and radio services;
4. Co-ordinated insurance for assets and for volunteers;
5. Sent 3,680 items by courier and processed approximately 1.26 million pieces of outgoing and incoming mail;
6. Advanced warehousing in Smithers, Fort St. John and Prince George;
7. Converted several offices to the use of the Administrative Records Classification System;
8. Gave training sessions in Records Management in Victoria, Prince George and Fort St. John.

Planning and Assessment Branch

The mandate of the Planning and Assessment Branch is to assist the ministry's Executive in coordinating policy and technical issues involving several program interests. The branch achieves this by:

1. representing the Ministry on inter-agency committees and task groups;
2. preparing environmental management plans;
3. preparing integrated analysis of major project development proposals; and
4. undertaking economic analyses for programs.

Inter-Agency Activities

The branch was involved in over 20 projects associated with other government agencies during the year. These covered a wide range of issues and included such diverse activities as:

1. a leading role in committee coordinating the implementation of wilderness policy for the government;
2. consultation with the Ministry of Forests to improve the quality of environmental submissions to Timber Suppy Area planning;
3. development of a strategy to reduce damage to standing forage crops by wildlife in the East Kootenays;
4. coordination of Ministry response to the government's regionalization initiative; and
5. representing the ministry on the provincial Aquaculture Steering Committee.

Two projects initiated very late in the year which have significant future implications for environmental management are the provincial Long Term Plan coordinated by the Premier's Office and the implementation of the recommendations of the National Task Force on Environment and Economy. The branch met with a number of provincial ministries to review policies and practices that supported the concept of sustainable economic development within a sustainable environment. It has advocated that the principle of sustainable development be included in the government's long-term planning approach. The director of the branch represented the provincial government on the Secretariat to the National Task Force on Environment and Economy.

The branch was active in a number of "coastal zone" activities. Staff organized the ministry program to develop waste management regulations, environmental monitoring requirements and environmental guidelines for marine salmon farms. In addition, the branch undertook the following tasks: coordination of the Ministry response to the Coastal Resource Interests Study for the Western Strait of Georgia, a recommendation of the 1986 Gillespie Inquiry into the aquaculture industry; support for the Wildlife Program's involvement in the Pacific Estuary Conservation Strategy; and continuing assistance to the Regional Directors, Vancouver Island and Lower Mainland, in the implementation of the Cowichan, Fraser and Squamish estuary management plans. This included the development of a long term plan for controlling liquid wastewater disposed into the the Fraser River estuary.

The branch assumed a key coordinative role in devloping a basis for discussion and resolution of the longstanding water use conflict on the Nechako River. An agreement was reached between the three parties involved (Aluminum Company of Canada Ltd., the Department of Fisheries and Oceans, and the Province) which allowed further development of Alcan's power generation capacity, while ensuring preservation of the important chinook salmon population in the river.

The branch continued to represent the ministry of the Canadian Council for Resource and Environment Ministers (CCREM) Research Advisory Committee. This committee developed a cross-Canada inventory of current research being undertaken by government, universities and industry in environmental protection. It also coordinated a number of research projects involving the federal government, Ontario, B.C. and Alberta.

The director of the branch completed his work with the International Joint Commission's Flathead River International Study Board. The board, consisting of three Canadians and three U.S. representatives, was established in 1985 to examine the potential impacts of the proposed Sage Creek coal mine on the Flathead River's water quality and quantity at the International Boundary and in Montana. A draft report was submitted to the commission in October, followed by a request to prepare a supplemental report on data gaps and impact mitigation opportunities. Final drafts of both the board report and its supplemental report were completed by the end of the fiscal year.

The branch coordinated the development of ministry positions on 41 Official Community Plans and Rural Land Use Bylaws being prepared by local governments. Ministry positions deal with concerns such as fish and

wildlife habitat protection, soil suitability for development, flood and hazard land designation and waste/water servicing.

Planning and Policy Coordination within the Ministry

The branch was involved in ministry planning activities at all levels from provincial to operational. At the provincial level, staff worked with program directors to produce a statement of current environmental issues, which will serve as a first step towards a revision of the Ministry planning document (A Statement of Ministry Priorities 1985–1990). Program plans were completed for the Pesticide Management, Surveys and Resource Mapping, and Administration and Technical Services programs, and work continued on the development of a provincial wildlife strategy and provincial species statement. As an offshoot of the provincial wildlife strategy, the Branch chaired a working group charged with preparing a Land Management for Wildlife strategy that would lead to protocol agreements with the Ministries of Forests and Crown Lands.

At the regional level, the branch also continued to provide support to the Wildife Program in preparation of ten regional wildlife plans that, for the first time, incorporate habitat management objectives and integrate habitat management activities with species management.

At the sub-regional level, work continued on the Bulkley Valley and Nechako wildlife plans, and on integrated environmental management plans for the Oyster River, West Arm of Kootenay Lake, Shuswap Lake and Okanagan Lake areas. Two multi-disciplinary operational plans — the Elk Lake Water Quality study and the Elk Valley wildlife plans — were undertaken at the request of regional staff.

During the year, the branch assumed the chairmanship of the ministry's Information Steering Committee. This committee is responsible for coordinating the implementation of a three-year strategic plan for information systems development which emphasized integrated information systems and need for regional offices to develop computing capability. The committee also prepared a number of policies and procedures for coordinating development of ministry information systems and for budgetting.

The branch was also asked to draft legislative amendments to the Environment Management Act to improve the efficiency and effectiveness of the environmental appeal process. This Act affects the appeals under the Water Act, Wildlife Act, Waste Management Act and Pesticide Control Act.

Socio-Economic Analysis

The economic analysis group in the branch undertook a range of studies for various programs in the ministry. In waste management, the Branch coordinated a survey of all municipalities and regional districts to determine quantities and costs of solid wastes disposed by landfills. Current levels of recycling were also determined. A review of policies in selected other Canadian provinces and U.S. states for recycling and reducing municipal wastes was also undertaken. Late in the year a discussion paper outlining a range of options for managing solid waste (recycling, beverage container deposit system, energy-from-waste, procurement policies and funding) was prepared and submitted to Cabinet for public release. The branch also assisted the Waste Management Program in preparing public information materials for the Okanagan Water Quality project and evaluate alternative methods for managing wood wastes in Williams Lake.

In fisheries management, an angling survey was conducted in the Dean River to provide information for setting a new schedule of fees for angling licences under the special fisheries policy. The branch provided economic input to evaluation of forest road access into the Babine River and completed an economic analysis of the pilot scale trout hatchery on the Peace Canyon Dam. The branch also completed the first of two reports on the results of the national freshwater angling survey for British Columbia. A compensation fund was established for the Lower Arrow lakes based on an agreement between B.C. Hydro and the ministry.

In wildlife management, the branch undertook a major evaluation of the trapping industry and initiated an analysis of illegal hunting across the province. A summary of the economic impact of wildlife-based recreation in the province was completed, indicating the major effect that the expenditures of hunters and wildlife enthusiasts have on the service industry of the province. Economists in the branch also worked with staff in the Wildlife Branch and the Ministry of Tourism, Recreation and Culture in developing a program to stimulate development on wildlife viewing opportunities across the province. Other tasks for the wildlife program included an evaluation of the C.O.R.E. hunter training program and mitigation of wildlife impacts caused by the Coquihalla Highway.

In Surveys and Resource Mapping, the branch undertook an analysis of pricing policy for TRIM digital map products, subsequently approved by Treasury Board. A more general policy on pricing digital map products across government was drafted late in the year.

Project Assessment Activities

The provincial mine development review process experienced the busiest year ever, dealing with submissions from 20 mine proponents. As with last year, most of these proposals were for the mining of precious metals in the north-west region of the province. The branch coordinated reviews of letters of intent and the development of terms-of-reference for Stage I studies for the Westmin Expansion, Wingdam, Willa, Sulphurets, Silver Queen, Sherwood, Samatosum, Congress, Headly Tailings, Lara, Lumby and Dome precious and base metal mines. Stage I reports were reviewed for the Johnny Mountain, Greenhills (Falcon Pit), Golden Bear, Silbak Premier and Al Gold projects, and Stage II reports for the Mt. Klappan and Cinola projects.

The branch continued to represent the ministry on the provincial Reclamation Advisory Committee, the government/industry Research and Technical Committee on Reclamation and the government/industry Acid Mine Drainage Task Force. The latter group conducted a survey of 93 mining operations in the province to summarize B.C. experience in acid mine drainage management and will prepare a submission to the federal and provincial governments and the mining industry recommending a long-term research program to develop more effective means of dealing with this serious environmental problem.

The branch was involved in coordinating ministry assessments, responses, and positions on a variety of other industrial, transportation and energy projects.

Branch coordination continued for the ministry on offshore hydrocarbon exploration assessment, Fraser-Thompson transportation management and the Roberts Bank Environmental Review Committee.

Several major energy proposals were initiated by proponents, including a coal-fired thermal generation project in East Kootenay, and a natural gas electrical generation facility in the Okanagan. Reviews of these projects are being coordinated by the Planning and Assessment Branch.

A major new communication link across the province, the B.C. Tel Fibre Optic project, was commenced in 1987 with overall environmental coordination provided by the branch.

Environmental Laboratory

General

The Environmental Laboratory provided chemical and biological analytical services (including fish bioassay) to the Ministries of Environment, Forests, Agriculture, Health and Finance. It also provided analytical services to Crown corporations such as B.C. Hydro and some municipalities. Routine tests conducted at the laboratory totalled 2,367,574 workload units (one workload unit is 1 minute of analytical time). In addition, project time for method development and sample management system resulted in 632,088 workload units. The laboratory also carried out analysis for 41 legal cases for 22,800 workload units which resulted in six court appearances.

Operations Division

The Operations Division continued to provide chemical services for inorganic and organic analyses of water, wastewater, sediments and biological materials and biological services for taxonomic identifications, fish bioassays and microbiological testing of water. During 1986/87 the Operations Division completed 1,970,830 workload units of routine and special analyses tests.

Quality assurance work was continued under the Federal-Provincial Monitoring Agreement. The results obtained from the federal-provincial inter-laboratory quality assurance studies were statistically analyzed and a draft report comparing the federal and provincial agency results has been completed. The staff of the Operations Division also participated in the investigation, development and recommendation of a standard leachate procedure to be used nationally to define "leachable toxic waste" under the Transporation of Dangerous Goods Act.

Special Services Division

The Special Services Division provides services in the areas of air quality monitoring and quality assurance.

The Air Quality Sections continued to provide both laboratory analyses and a data reporting service for ministry air quality monitoring within the province. Some 30 continuous air monitors were operated and approximately 15,000 laboratory analyses of air related samples, including precipitation, were carried out. Project work authorized by the Waste Management Branch either continued or was initiated in the specialized areas of TRS monitoring and toxic organics. In addition, a course leading to ministry certification was given in Opacity Reading. Report preparation and laboratory analyses were carried out for approximately 15 stack surveys.

The Quality Assurance Section carried out 24 internal audits of laboratory test methods. Participation in various external inter-laboratory comparison studies, including both the Long-range Transport of Atmospheric Pollutants (LRTAP), and Water Quality Agreement studies, was continued. The results of both internal and external audits were summarized in the Annual Laboratory Performance Report. Performance audits of 60 continuous TRS and sulphur dioxide monitors operated by industry were carried out. Periodic audits of the 30 ministry continuous monitors were similarly carried out.

The following reports were completed in 1987/88:

1. Laboratory Performance Report, 1987.
2. TRS Method Comparison for Source Testing, January 1988.
3. Ambient Speciation of TRS using the Photovac 10S70 Analyzer, January 1988.
4. TRS Audit Procedures for GC Analysis, January 1988.
5. Grans Titrations and Ion Balances: Some Analytical Control Limits for Precipitation and Surface Waters, Env. Sci. Technol. 22, 590 (1988).
6. Prince George Incineration Project Report (Incineration of PCP treated woodwaste and the measurement of toxic organics in the discharge) — 1987.

Computing Services Branch

The Computing Services Branch is responsible for providing comprehensive computing and systems services to the ministry programs in support of program delivery.

In 1987/88, the ministry formulated a long term Strategic Systems Plan, to provide the foundation for all future activities in information systems within the ministry.

Several major systems initiatives were started during the year:

- a management information system for the Parks Division which allows better management and user satisfaction;
- an automatic data capture system for the Environmental Laboratory to increase sample throughput;
- new stereo-digitizing and cadastral compilation software and hardware to improve the quality of maps at the Surveys and Resource Mapping Branch.

In addition, improved efficiency was achieved through the continued introduction of micro-computers.

The management of information systems at the ministry have been administered according to the managerial framework developed at B.C. Systems. This has ensured compliance with the management guidelines identified in the government's Information Systems Management Framework policy. The following activities were completed or initiated during 1987/88 in further support of the policy:

- Regional issues were evaluated in terms of budgeting and systems planning;
- All new application development is being reviewed to determine opportunities to develop Ministry-wide applications;
- An independent study of VAX resource demand and alternatives for supplying the expected demand growth was undertaken.

In addition, the ministry undertook the following activities in 1987/88 to further stabilize its technical direction and to ensure compliance with technical standards established by Treasury Board.

- Conversion to the BC Systems DNET communications network was completed.
- Software standards were developed for wordprocessing.
- Standards were defined for the purchase of micro-computers within the ministry.

Conservation Officer Service

The objectives of the Conservation Officer Service are:

1. To promote compliance with environmental legislation through public education, public awareness and public involvement.
2. To enforce environmental legislation through investigation of possible violations and prosecution where warranted, under the direction of regional directors, who will be guided in setting regional priorities by overall ministry enforcement policy and individual program objectives.
3. To respond appropriately to public requests for assistance regarding problem or nuisance wildlife in order to protect private property and/or to ensure public safety.
4. To attend environmental emergencies in accordance with regional emergency response plans.
5. To provide other support to ministry programs as prescribed by regional directors.

Summary

The Conservation Officer Service is the investigative and enforcement arm of the ministry.

Our 105 uniformed, well-trained officers enforce and investigate violations of eight provincial statutes and five federal statutes including the Criminal Code of Canada, covering all aspects of the protection of the environment and fish and wildlife resources.

Our officers investigate over 8,000 offences yearly and lay over 4,000 charges.

They are also involved in a community relations program carried out regularly and through the 47 district offices across the province to promote compliance with the legislation through public education, awareness and involvement.

In addition, officers respond to requests from the public for assistance regarding dangerous or nuisance wildlife.

The violation statistics reported below have changed significantly from 1986/87, as the data are now compared to their date of entry rather than to the offence date. This allows for the capture and comparison of data which would otherwise be bypassed.

Statistics	1987/88	1986/87	(+/−)
Charges	4,084	4,793	−15%
Convictions registered*	3,100	3,830	−19%
Warnings issued	1,904	1,059	+50%
Fines levied	$336,966	$430,961	−22%

* This total includes the "deemed guilty" convictions provided for under the Offence Act.

Conservation officers contacted 34,448 hunters, 54,687 anglers and 52,391 other persons during fiscal year 1987/88.

The Conservation Officer Service is involved in the following five programs. Conservation officers spent 66 per cent of their time on program activities.

Wildlife Program

The following legislation is enforced:
Wildlife Act
Firearm Act
Migratory Birds Convention Act
Customs Act
Game Export Act

Conservation officers spent 46 per cent of their total time on wildlife enforcement duties and contacted 31,094 resource users.

Statistics	1987/88	1986/87	(+/−)
Charges	2,169	2,795	−22%
Convictions registered*	1,551	2,274	−32%
Warnings issued	1,193	716	+32%
Fines levied	$194,761	$239,618	−19%

The violation rate for hunters was 11 per cent (11 out of every 100 hunters checked in the field were found to be in violation of an act or regulation). This rate is 1 per cent higher than 1986/87.

Wildlife Control

Conservation officers spent 13 per cent of their time handling nuisance and dangerous wildlife complaints and responded to 1,462 complaints from the public in this regard, as follows:

	Complaints Received	Complaints Acted On	Destroyed	Relocated
Black bear	2,563	697	521	105
Grizzly bear	155	42	18	15
Cougar	399	147	13	2
Wolf	242	97	69	0
Other	4,901	479	125	4

Fisheries Program

The following legislation is enforced:
Fisheries Act (Canada)
Fisheries Act (Provincial)
Wildlife Act: Those sections of the Wildlife Act dealing with angling in non-tidal waters.

Statistics	1987/88	1986/87	(+/−)
Charges	1,654	1,678	− 1%
Convictions registered*	1,383	1,413	− 2%
Warnings issued	536	295	+82%
Fines levied	$115,830	$139,031	−17%

Waste Management Program

The following legislation is enforced:
Waste Management Act
Environment Management Act
Litter Act
Conservation officers spent a total of 1 per cent on the enforcement of waste management legislation.

Statistics	1987/88	1986/87	(+/−)
Charges	178	169	+ 5%
Convictions registered*	117	33	+355%
Warnings issued	102	12	+850%
Fines levied	$21,275	$39,952	− 53%

Water Management Program

Conservation officers spent 1 per cent of their total time on enforcement of the Water Act.

Statistics	1987/88	1986/87	(+/−)
Charges	11	3	+367%
Convictions registered*	4	2	+100%
Warnings issued	5	2	+250%
Fines levied	$150	$500	− 30%

Pesticide Control Program

Conservation officers spent 1 per cent of their total time on enforcement of the Pesticide Control Act.

Statistics	1987/88	1986/8	(+/−)
Charges	33	11	+300%
Convictions registered*	27	8	+330%
Warnings issued	4	0	+400%
Fines levied	$3,350	$2,650	+ 26%

Other

Conservation officers, in the course of their duties lay charges under various other federal and provincial statutes, including the Criminal Code of Canada, Canada Shipping Act, Motor Vehicle (All-Terrain) Act, Park Act and the Trespass Act. In the year 1987/88, charges laid under other legislation resulted in 18 convictions with a total of $1,600 in fines being levied.

Administration matters accounted for 31 per cent of Conservation Officer time.

Conservation officers attended 613 meetings and gave 390 talks to schools, service clubs, hunting and naturalist groups.

Training

A three-week enforcement training course was held in February, 1987 at the B.C. Policy Academy for 25 conservation officers and four parks officers. This course is for new conservation officers and is designed to prepare them with the knowledge and skills required for conservation enforcement duties. One Cross-Cultural Course was held for a total of 24 conservation officers. As well, training was provided for 12 conservation officers in how to deal effectively with hostile individuals. These seminars are worthwhile experiences and will be given to all conservation officers. Two-week-long Investigators Courses were held for 48 officers. This course will be continued until all officers have received this advanced course, with the emphasis on conducting intensive and extensive investigations. Two new conservation officers underwent the six- month orientation training which includes written tests and assessments.

Recreational Safety

The administrative responsibilities for commercial river rafting, boating regulations, off-road vehicles and outdoor recreational safety were transferred to this Ministry in February from the Parks Branch. This was a consequence of the 12 commercial river rafting fatalities in 1987 and the subsequent appointment of Mr. Ralf Aldrich of the Conservation Officer Service as the Registrar of Commercial River Rafting. One full-time position was transferred from Parks to assist the Registrar on the river rafting program and to administer the other responsibilities that were transferred with the position and described below.

Commercial River Rafting

In response to the 1987 commercial river rafting fatalities, the minister appointed a Commercial River Rafting Advisory Committee to make recommendations on guide qualifications, amendments to legislation, equipment requirements and improvement in enforcement. These recommendations were

submitted to the ministry on December 2, 1987, and were subsequently approved in principle by government.

The main recommendations adopted by government revolved around the drafting of new provincial legislation (which would replace river rafting standards under federal legislation) and the establishment of a training society to develop and implement an examination process for all commercial river rafting guides in the province.

Accordingly, the drafting of a new "Commercial River Rafting Safety Act" was a priority. The new Act addresses the registration process for companies and guides, safety standards, inspections and creates offences for non-compliance. The responsibility for developing and implementing an examination process was contracted out to the River Outfitters Association of B.C. (ROABC) at a cost of $55,000. The examination will consist of two parts — a written and a practical. The new legislation together with the guide examination process should enhance the safety of the river rafting industry in British Columbia.

Boating Restriction Regulations

The Boating Restriction Regulations (pursuant to the Canada Shipping Act) are implemented to avoid unsafe boating situations on the waterways of the province. A number of applications for boating restrictions were received and processed. There are currently 242 restricted waterways in the province which are listed in the Freshwater Fishing Synopsis published by the ministry.

Motor Vehicle (All-Terrain) Act

This legislation was enacted in 1972 to control the operation of off-road vehicles in the province as designated by regulation. The only off-road vehicles designated at this time are snowmobiles.

The legislation requires that owners of snowmobiles register with the Motor Vehicle Branch and attach the provided decals to their machines for identification purposes. There are approximately 50,000 snowmobiles registered at this time.

Since the introduction of this legislation, there has been a tremendous increase in other types of off-road vehicles, such as trail bikes, three- and four-wheel ATC's, four-wheel drives, dune buggies, etc. Accordingly, there have been numerous requests for government to pass new regulations that would control the environmental and property damage associated with improper use of these other off-road vehicles which are estimated to number 100,000.

In reponse to these concerns, the ministry has joined with the Ministry of Solicitor General in preparing a joint Cabinet Submission to obtain direction concerning these issues.

Outdoor Recreational Safety

This ministry supplies administrative and financial support to aid non-profit organizations that promote safety and provide public services in the field of outdoor recreational safety. A total of $5,000 was granted during 1987/88.

Information Services Branch

Introduction

Information Services Branch provides comprehensive communications and public affairs services to the ministry. The branch is responsible for strengthening links with the public and for developing understanding and support for the ministry's major programs.

To meet this responsibility, Information Services provides information about the ministry's programs and services to the public, the media, and special interest groups. The branch coordinates release of information to the media, develops and distributes material to the public and special interest groups on ministry programs and activities, and provides planning and technical support to the ministry's executive in the area of public relations and communications.

Specifically, the branch is responsible for the following:

1. Planning and implementing communication strategies on ministry initiatives and priorities;
2. Researching and drafting news releases, articles and pamphlets;
3. Coordination of ministry advertising and media relations;
4. Developing and providing environmental education programs and materials;
5. Maintaining a library and reference service for ministry staff and members of the public concerned with environmental issues;
6. Developing or coordinating preparation of audio-visual programs, films, videos and public exhibits; and
7. Supporting regional and headquarters staff in their communication needs.

Highlights

During 1987/88, increased emphasis was placed on direct involvement of regional ministry staff in implementing communication programs. Priority was also given to establishing cooperative project relationships with other government ministries, non-government organizations and the private sector. As well, the ministry had a significant informational advertising program for the first time in several years, including province-wide use of radio.

For the centennial year of wildlife conservation in Canada (Wildlife '87), the branch provided comprehensive communications support to the Centennial Wildlife Society of B.C., which coordinated the celebration in the province.

With the cooperation of the news media and a wide spectrum of wildlife and naturalist groups, the branch carried out a major promotion campaign inviting British Columbians to help select the provincial bird. The Steller's jay was given official designation after proving the favourite among over 80,000 votes cast.

An important new direction was pursued through the involvement of the private sector in joint-venture communications projects with the ministry. These included the successful co-publishing, with Maclean Hunter Ltd., of an improved Freshwater Fishing Regulations Synopsis, as well as participation by Shell Canada Ltd. and a number of radio stations in a major promotion of B.C. Parks. Radio stations across the province also participated extensively in the B.C. Bird project.

A major public information program on special waste management was implemented to complement the public consultation activities of the Special Waste Advisory Committee.

A comprehensive communications program for handling the problem bear issue in the Lower Mainland region was put in place, with a variety of printed materials developed and distributed to key target audiences in the region.

The Minister's Environmental Awards for 1988, recognizing exceptional contributions to environmental quality in the province, included a greater number of categories than in previous years, including individual citizen, youth group, citizen's group, business/industrial, government agency and environmental education. Recipients included Mr. Bert Hoffmeister, School District No. 24 (Kamloops), the Nanaimo Band Council, the Nanaimo Fish and Game Club, the Valley Fish and Game Club (Lake Cowichan), Canada Safeway Ltd., the District of Delta and the Williams Lake Field Naturalists. Nominations for the awards can now be made by the general public.

Media Relations

During 1987/88, 151 media releases were issued and nine news conferences were conducted on subjects of environmental interest. The ministry's first video news release, dealing with the selection of the provincial bird, was aired in November. The branch also handled over 12,000 specific information requests from news media and the public.

Written policies and procedures on media relations and public access to information were developed for review within the ministry.

Education

Province-wide school participation in Wildlife Week and the B.C. Bird project was encouraged through the distribution of special teacher and student material.

A 12-minute video introducing the new wildlife education program, Project WILD, was produced for airing on the Knowledge Network. Over 450 teachers were trained in the use of project materials in their classrooms.

Full implementation of the Resources and Wastes education kit in secondary school Consumer Education courses was carried out, as well as further promotion of the Encore outdoor education package.

A brief on environmental education was submitted on behalf of the ministry to the Royal Commission on Education.

Library

Computerization of library services continued, including use of the Envoy electronic mail system to improve turnaround on interlibrary loans and conversion to an on-line catalogue system. The range of on-line services subscribed to by the library, which now provides access to about 400 data bases, was further extended through the addition of the National Library of Canada's DOBIS service.

In addition, a marketing brochure on library services was circulated through the ministry, and there were numerous regional visits by the librarian to assist with maintaining and developing regional collections.

Publications

Thirty-one new publications aimed at a general audience were produced, and 77 publications were revised or reprinted. The branch also reviewed or processed 29 technical publications on behalf of ministry programs.

Among the notable new publications were:

1. "People and Bears", an information package to help householders deal with the problem of bears in residential areas;
2. "Wildlife in B.C.", a short booklet outlining the resource value of wildlife and its importance to the province;
3. A brochure explaining the ministry's new floodplain management policies;
4. A resource list of materials available to schools from the ministry;
5. A new brochure on the grizzly bear in B.C.
6. A brochure for the federal/provincial Storm Drain Marking Program, titled "Are You Killing Your Fish?";
7. A brochure outlining the services of the Environment Library.

The Ministry of Environment and Parks published or reprinted the following information brochures and scientific or technical reports in 1987/88:

Environment Information Brochures and Publications

Ministry of Environment and Parks Annual Report, 1986/87
B.C. Hunting and Trapping Regulations Synopsis, 1987/88
B.C. Freshwater Sport Fishing Regulations Synopsis, 1987/88
Limited Entry Hunting Synopsis
Fraser Valley Special Licence Hunting Area brochure
Special Waste Regulations
Special Waste Legislation Guide
Special Waste Fact Sheets
Are You Killing Your Fish? brochure
Eurasian Water Milfoil in B.C.
Wildlife in B.C.
Striking the Balance
Game Farming in B.C.
Special Fisheries in B.C.
The Dean River Special Fishery Pilot Project
Environmental Awards brochure
Environment and Parks Publications brochure
Educational Resource List 1988
Floodplain Management in B.C.
Grizzly Bears in B.C.
People and Bears package
Vote For Your B.C. Bird school kits
The Falcon Is Telling Us Something (Report of the Committee of Enquiry on Falcons)
Report of the Advisory Committee on Commercial River Rafting in B.C.
Managing Problem Bears: A Program Review
Stocked Lakes list (Lower Mainland)
Robson Bight Ecological Reserve brochure
Provincial Park brochures (31 titles) (R)
Wildlife Centennial brochure (R)
Care of Game Meat (R)
CORE (Conservation and Outdoor Recreation Education) (R)
Preventing Raccoon Problems (R)
Ecology (R)
Safe Pesticide Use (R)
Observe, Record, Report brochure (R)
Caribou in B.C. (R)
Cougar in B.C. (R)

Elk in B.C. (R)
Mountain Goat in B.C. (R)
Moose in B.C. (R)
Animal Tracks (R)
Don't Move Live Fish (R)
How to Obtain an Approval Under the Water Act (R)
Things to Do Outdoors in B.C. Provincial Parks (R)

Scientific and Technical Reports

Snow Survey Bulletin (6 issues)
Report of the 1986 Municipal Solid Waste Management Survey
B.C. Coastal Fisheries/Forestry Guidelines and Field Guide
Pollution Control Objectives for Food Processing (R)
Pollution Control Objectives for the Forest Products Industry (R)
Sensitivity of Western and Northern Canada Soils and Geology to Acidic Inputs
Soils and Geology Sensitivity Mapping in Western Canada
Source Testing Code for the Measurement of Total Reduced Sulphur Compounds from Stationary Sources
Coastal Grizzly Research Project report
Wolf Management in B.C.: The Public Controversy
A Terrain Evaluation Method for Predicting Terrain Susceptible to Post-logging Landslide Activity
Second Report on Chemical Sensitivity of B.C. Lakes to Acidic Inputs
Castlegar Air Quality
Proposed Log Management Strategy for the Squamish Estuary
Vancouver Island Wolf Control Program report
CAPAMP Vol. I
LRTAP Annual Report 1985
Muskwa Wolf Management Program 1986/87 Annual Report
Quesnel Highlands Wolf Control Project report
Peale's Peregrine Falcon in B.C.: Status and Management
Effects of Wastewater Releases by the City of Vernon
Surface Coal Mining and Municipal Sewage
Nest Tree Selection by Primary Cavity-nesting Birds in South-central B.C.
Habitat Survey of the Mackenzie Heritage Trail

Environmental Appeal Board

The Environmental Appeal Board operates under the provisions of the Environment Management Act (1981). Its purpose is to hear appeals to decisions made under environmental legislation. The board, appointed by Cabinet, consists of a chairman and a sufficient number of board members to deal with appeals expeditiously. During the period covered by this report (1987) there were 24 board members.

Seventy licences, permits or orders of the Director of the Waste Management, the Deputy Director of the Wildlife Branch, the Comptroller of Water Rights, and the Administrator of the Pesticide Control Act were appealed in 1987, compared to 73 the previous year. These appeals resulted in 35 hearings (oral 32, written 3), compared to 39 in 1986. There were 111 appellants (97 in 1986), some of whom appealed the same licence, permit or order.

Of the appellants, 22 won their appeals and ninety-four (94) lost their appeals. Twenty-six withdrew or abandoned their appeals and three appeals were rejected by the board because of late filing. One appeal was nullified because of cancellation of the permit just prior to the hearing.

Two applications were made to the Lieutenant-Governor in Council to rescind decisions of the board. Both of these applications were denied.

Two of the board's decisions were appealed to the Supreme Court of British Columbia for judicial review. In both cases the Court essentially upheld the board's decision, and both were subsequently carried to the Court of Appeal.

The following is a breakdown of the results of appeals conducted in 1987 in relation to the four ministry programs they concerned:

Pesticide Control Branch	
Number of Appeals	90
Appeals Upheld	20
Appeals Denied	53
Appeals Abandoned or Withdrawn	14
Appeals Rejected	2
Permit Cancelled	1
Waste Management	
Number of Appeals	39
Appeals Upheld	0
Appeals Denied	32
Appeals Abandoned or Withdrawn	7
Appeals Rejected	0
Water Management	
Number of Appeals	12
Appeals Upheld	0
Appeals Denied	7
Appeals Abandoned or Withdrawn	4
Appeals Rejected	1
Wildlife Branch	
Number of Appeals	5
Appeals Upheld	2
Appeals Denied	2
Appeals Abandoned or Withdrawn	1
Appeals Rejected	0